

FOOD INDUSTRY

VOLUME 15
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MAY/
JUNE

A PUBLICATION OF ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA)

**MAP OF
FRESH FRUITS**

**ISO 9000
Management System**

Geriatric Foods

Mad Cows

Fat Spread

Soybean Industry

ASSOCIATION OF FOOD SCIENTISTS AND TECHNOLOGISTS (INDIA) MYSORE - 570 013

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in

- * Affiliated to the Institute of Food Technologists, Chicago, Illinois, U.S.A.
- * The Association is a professional and educational organization of Food Scientists and Technologists, with its headquarters at Mysore.
- * The chapters of the Association the association are located at Bangalore, Bhopal, Bombay, Calcutta, Delhi, Hisar, Hyderabad, Jabalpur, Jaipur, Jammu, Kanpur, Karnal, Kharagpur, Ludhiana, Madras, Manipur, Nagpur, Pantnagar, Parbhani, Pune and Thiruvananthapuram.

Objectives :

- * Advancement of all the aspects of Science and Technology relating to production, processing and distribution of food, with the ultimate objective to serve humanity through better food.
- * Promotion of research, development and training in the Science, Technology and Engineering of Food.
- * To provide a forum for exchange, discussion and dissemination of knowledge and current developments, especially among Food Scientists and Technologists as well as the Public and Society at large.

Major activities :

- * Publication of 'Journal of Food Science and Technology' (bi-monthly) and 'Indian Food Industry' (bi-monthly),
- * Holding symposia/conventions on different aspects of Food Science, Technology and Engineering
- * Arranging Lectures and Seminars for the benefit of Members and the Public.

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- * Membership is open to graduates and diploma holders in Food Science, Technology and Engineering as well as to those engaged in these professional activities.
- * Types of membership include Life Member, Life Member (Resident Abroad), Corporate Members, Full Member, Member (Resident Abroad), Affiliate Member, Student Member and Student Member (Abroad).
- * Each member will receive a free copy of the 'Journal of Food Science and Technology' or 'Indian Food Industry,' as per the option exercised.

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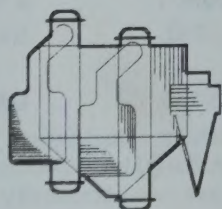
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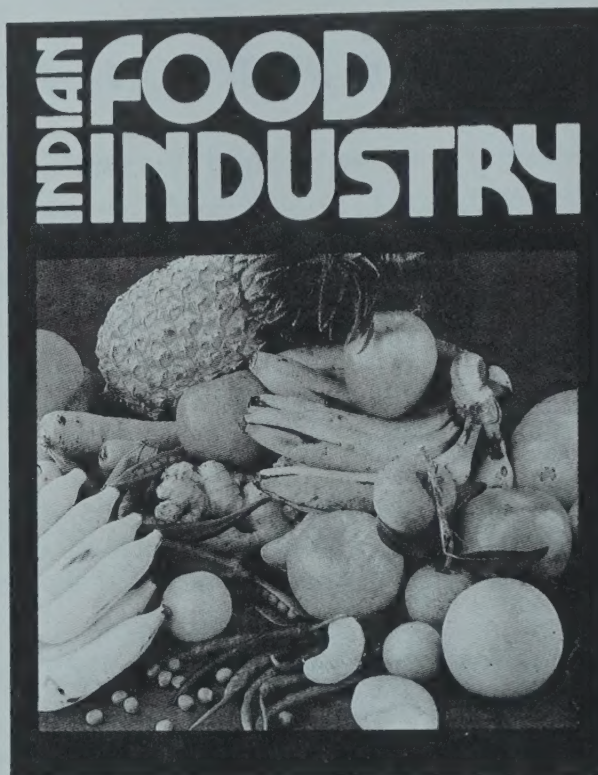
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Review articles, technology papers based on R&D work and reports on various aspects concerning food industry are welcome from food scientists and technologists from industry, research institutions and other related organisations. Contributors are advised to provide good quality illustrations in the form of charts and photographs along with the manuscripts. The Editorial Board reserves the right to edit the manuscripts in order to make them suitable for publication in the journal.

Food industries may send information (suitably illustrated with photographs) about their new products, machinery, business ventures and other developments, which will be published on the discretion of the Editorial Board.

Subscription: All members of AFST(I) are entitled to receive the **Indian Food Industry** journal regularly free of cost, if they opt for it. Members who are receiving **Journal of Food Science and Technology** and desirous of changing over to **Indian Food Industry**, can do so by sending a formal request to the Executive Secretary, AFST(I). Alternatively, they can subscribe to **Indian Food Industry** by paying an additional amount of Rs 50. The regular subscription rates for the journal are as follows:

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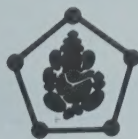
The hottest areas in food demanding the attention of Food Scientists and Technologists now are food quality and food safety, natural and functional foods. There is an urgent need to revamp our food quality and safety rules. It may be relevant to mention here that the US President has recently tightened his country's meat inspection system with new rules that for the first time impose scientific tests for disease causing bacteria.

Nutritionists, food scientists, food marketers and others are exploring how today's traditional food and perhaps formulations can create a healthier tomorrow. Lycopene in your tomato sauce? Beta carotene in your soup? As the 20th century approaches all these no longer seem to be a fantasy.

We are the second largest producers of fruits and vegetables. But post-harvest losses also are substantial. Minimising these losses is as important as producing. There is tremendous scope for export of agro-food products which is highly lucrative. However, quality and hygiene are the most important factors for boosting exports. But is the industry geared for supplying the world high quality foods at a competitive price? We must also identify products and markets where India can be globally competitive and concentrate on them. Awakening quality consciousness at this juncture is most important if we have to make it big in the international market what with many international food giants entering the Indian market with Canada's McCain Foods' proposal to set up a 100% subsidiary to manufacture French fries, being the most recent one. According to Mr. V. Allan Krejci, Director of Public Relations, Indian food is going to be the next fastest growing ethnic food in the US. Tie ups or joint ventures seem to be the order of the day. An American food giant, Minnesota-based Hormel Foods Corporation has recently announced a tie up with a British-based Indian food company to distribute a variety of bottled Indian pickles, spices and cooking ingredients in the US.

As Chief Editor, having taken over from Sri S.P. Pillai, I am pleased to place this third issue of your journal INDIAN FOOD INDUSTRY before you, although belatedly. I place on record the great work done by my predecessor and his devoted team who brought this journal to the present status. I look forward to your co-operation and support to raise this journal to still greater heights in the future also.

Rugmini Sankaran
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Oprah Says No to Beef

A fear has been created in US over eating of beef, which may cause mad cow disease. It has been observed that meat and bone meal made from cattle is routinely fed to other cattle to boost the meat and milk production.

Scientists have observed that the practice probably helped spread Bovine Spongiform Encephalopathy (BSE) or mad cow disease to thousands of cows in Britain, until it was outlawed in 1989.

No cases of BSE have been observed in the United States. As a caution, the US cattle industry has called for a voluntary ban on the feeding of ruminant protein to other ruminants.

In view of this, European Union for Agricultural Commission have suggested to British Government for a selective slaughtering programme.

Image Impasse

The Tabaffer India has developed a product with the potential to be a winner ; a tablet - based soft drink branded *Lorino*. A market research has indicated that consumers are not only interested in the concept, but also liked the flavours in which *Lorino* had been test-marketed. This product is a novelty in the Indian context. Each tablet of *Lorino* provides a full glass of soft drink in a particular flavour, when dissolved in 200 ml of water.

Presently, the soft drink market, though a low-volume one in comparison to the total beverage market, is far more impressive in terms of value - Rs. 13000 crore per annum. The aerated soft- drink accounts for Rs 1100 crore; tetrapacks Rs 150 crore; concentrates Rs 60 crore; and branded squashes Rs 25 crore.

In order to project the *Lorino's* brand image, the company has arrived at the consensus centered around three factors :

1) *Lorino* would be launched in the familiar cola, orange and lime flavours. 2) The price would be competitive with that of ASD's and tetrapacks and 3) Three kinds of packaging would be used ; a portable one for 10 tablets, a small one for 2 tablets and a container for 50 tablets.

Kaveri Bio Proteins' New Project

The Kaveri Bio Proteins Pvt Ltd., has recently set up a poultry feed manufacturing unit near Namakkal, Tamil Nadu with an investment of Rs 4 crore, having a production capacity of 8000 metric tonnes per month. The company has developed a scientific protein supplement called bio-pro, a substitute for the conventional lower quality and expensive ingredients like fish meal and oil cakes. The use of extrusion technology will eliminate disease causing organisms.

The company has also plans for setting up a vegetable dehydrating plant under its agricultural expansion activities.

Beer Parleys

The Dutch Beer Manufacturer Heineken's search for a partnership deal in India has ended up with the Venkateswara Group of Companies. The Indian company would be investing around Rs 400 crore. Initially, the company will market the product in the country and later would be going in for manufacturing the draft beer in India. The MoU is likely to be signed shortly.

A Slick Success

Marico, a Rs. 284 crore fast - moving company in consumer products has an annual compounded turnover rate of 28% with a net profit of 48% per annum since 1990-91. The net profit margin has moved from a mere 2.3% to 7.6% presently. Its turnover per employee has an impressive Rs 35.5 lakhs last year.

In the edible oil sector, as against the total market of 6,500,000 tpa, the company's share is estimated at 360,000 tpa. The company expects that the refined oil consumer packed (ROCP) market volumes to grow at about 9% per annum.

The company's market share in the line of jams has increased from 1.5 to 13%. They do not expect any threats from multinational companies (MNC), as their products are not in line

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of any multinational. In view of this, they need not have to face their right in either technology or in marketing.

Parle Agro Launches Its First Jelly Drink in Gujarat

Parle Agro launched its latest product, Joly Jelly in Gujarat recently. Billed as India's first jelly drink, the product has been developed in-house at the company's research laboratory and its development-to-launch process has been one of the fastest in the industry, according to reports.

Praj Industries' Overseas Ventures

Praj Industries Ltd, Pune would be setting up a distillery unit at Battla, Sri Lanka on behalf of Pelwatte Sugar Company with a capacity of 30,000 litres per day. The unit is based on its Hiferm-Gr fermentation process. Also, they would be installing the Flubex fluidized bed heat exchanger, which is an in-house development of Praj, meant for spent wash prior to composting.

The company also, has tied up with Packo of Belgium in offering the state-of-art technology for the dairy industry. This technology maintains a high level of hygiene and preservation of natural taste. The package includes a range of dairy technology like bucket milking, herringbone type, auto tandem

or pipe-line milking. This is in addition to systems like, pasteurizers, chillers, plate evaporators, self-cleaning range of milk separators & centrifuges, and air dispersion dryers already offered by the company.

Indusmin Foods Citrus Fruit Processing Plant

Indusmin Foods Limited has set up India's largest integrated state-of-the-art citrus fruit processing plant in technical collaboration with Ukraine to manufacture citrus pectin grade 150 and above, lemon oil and spray dried fresh natural lemon juice powder in Maharashtra.

Indusmin has successfully completed the implementation of the project and has commenced commercial production from end of March 1996. According to them, the quality of Indusmin's products namely, citrus pectin, lemon oil and spray dried fresh natural lemon juice powder are comparable to International Standards.

Bhandari Food Plans Unit for Coconut by-products

Bhandari Food Flavours Ltd. is setting up a manufacturing unit for coconut by-products near Bangalore at a cost of Rs. 7.3 crore. The unit will have an installed capacity to manufacture coconut cream at 2304 tpa, desiccated coconut powder at 1200 tpa coconut oil at 1170 tpa, and coconut water at

1500 tpa. The commercial production under the brand name 'cocunut' would be released by March 1997.

A Case for Plastics in Packaging

Contrary to the strong campaign, advocating eco-friendly biodegradable packaging materials in place of plastics, a voice is raised to save the plastic woven sack industry. According to Mr. Lalit K. Tulsayan, Vice-president, All India Flat Tape Manufacturers Association, the Jute Packaging Material (compulsory use of packaging commodities) Act 1987 is detrimental to the plastic woven sack industry and the major users of plastic woven sacks. Further, it also leads to substantial increase in the cost of commodities like cement. Under the Mandatory Jute Packaging order, 100 per cent foodgrains and sugar and 50 per cent urea and cement should be packed in jute bags. According to Mr. Tulsayan, about 17.80 lakh tonnes of jute goods are required to meet these mandatory provisions, while the annual production stood at 14 lakh tonnes, out of which only 7.20 lakh tonnes is available after meeting export needs and non-sacking purposes. The plastic sack woven industry has the capacity to meet the needs of bulk commodities.

Hence, he urged the government to review the act, removing cement, urea and sugar from its purview and gradually phasing out compulsions in respect of foodgrains. These measures, Mr. Tulsayan feels are necessary to put the plastic woven sack industry back on rails.

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A Food Giant Plans to Sell Indian Spices in US

The Hormel Foods Corporation, US has tied up with the Britain-based Indian Food Company, the Patak Spices Ltd., of Haydock, Lancashire to market various Indian spice products in US through setting up of super markets. They would market a variety of bottled Indian pickles, spices and cooking ingredients.

This joint venture is both in recognition of the growing market for Indian food has in North America as well as a move designed to make Indian food items more appealing to American palates. Patak's Foods is one of the well recognized international food brand names and is the second largest and fastest growing brand in Britain. Patak's Foods in Britain shares has about 36% of the total market and a sales turnover of \$ 25 million.

The Indian specialities available under the Patak's brand name include fruit chutneys such as sweet or hot mango, sweet lime, tropical fruits and nuts, and mango and lime.

Brooke-Bond Lipton Merges with Hindustan Lever

Hindustan Lever Ltd., (HLL) announced the merger of Brooke Bond Lipton India Ltd. (BBLIL) with it. The merger was with an objective to increase the share of processed foods in Unilever's turnover to 50% in

India. Foods account for 53% of Unilever's global turnover. In India, food accounts for only about 30%, with 45% share being claimed by soaps and detergents. The move will enable the high cash generating potential of HLL to be channeled into the high-growth food businesses of BBLIL.

World Bank Aid Sought to Boost Tea Production

Growing demands for tea in domestic market and the stagnated tea production have driven the Indian tea industry to seek financial help from World Bank to the tune of Rs. 2216 crores for implementing a project, aimed at achieving quantitative jump in tea production. Current demand in domestic market is estimated at 1000 million kg., while the current annual production remained at 750 million kg over the past few years. First of its kind on such mission, world Bank team visited India, recently to discuss the project report prepared by the Indian Tea Board at the instance of Ministry of Commerce, Government of India. The report envisages various measures like improved productivity, financing of cultivation in non-traditional areas and rejuvenation of the existing tea orchards. The world bank mission will consider other aspects of tea as an instrument of rural development, poverty eradication and employment generation, especially for tribals and women.

In this background, the call given by The All Assam Small Tea Growers Association to State Governments recently for providing infrastructural,

financial and other facilities is worth considering at the national level to improve the plight of tiny planters all over the country.

Thrust on Coconut Industry in 9th Plan

The Union Ministry of Agriculture has indicated that the coconut-based industry and the post-harvest technology would be given more emphasis in the Ninth Plan. This is in view of India still lagging behind in terms of post-harvest technology, which is impeding the progress in developing coconut-based industries. Products developed by countries like Philippines, Indonesia, Thailand and Sri Lanka have found much better export market in the international arena. Ministry has indicated that the Central Plantation and Crop Research Institute should start a separate division for developing post-harvest technology in coconut.

It has also been indicated that industries should be allowed to import advanced technology on a short term basis till such time that indigenous technology is developed by our scientists and technologists.

This year, the coconut production in the country is expected to cross 1500 crore nuts (1996-97) and 2000 crore nuts by 2000 AD. Kerala contributes about 45% of the total production. Presently, even Sri Lanka has as many as 38 coconut-based products marketed globally. During 1995, Philippines has exported over \$ 1 billion worth coconut products to other countries.

Use of Aspartame in Soft Drinks

The Health Ministry is likely to issue a notification, clearing the use of aspartame as a food additive. This will allow beverage multinationals like Pepsi and Coca Cola to go ahead with the production and distribution of diet range beverages in the country.

An artificial sweetener, aspartame is an essential ingredient used in the production of diet range of beverages. It is derived from aspartic acid and phenylalanine. The diet range of drinks to be introduced in the country in the next season, will be an addition to the existing range of sugar-based beverages. Pepsi has two diet drinks, Diet Pepsi and Pepsi Max, while Coca Cola has Diet Coke.

Use of Molasses in Liquor Manufacture

The Food Processing Ministry has reservations on the use of molasses in the manufacture of liquor by multinationals. The ministry has reportedly suggested that the foreign collaboration approvals to multinationals should be amended and an additional condition be imposed that they should procure non-molasses based alcohol from licensed manufacturers only. Seagram is one of the companies buying non-molasses alcohol from the Kedias.

The government has, so far, followed an arbitrary policy in issuing licence. On the one hand, multinationals like

Seagram, Hiram Walker and White and Mackay are manufacturing liquor from non-molasses alcohol, and on the other hand, International Distillers and Vinters and Macdonald and Muir are manufacturing liquor using molasses.

The price factor has a major role to play in the use of molasses. Molasses alcohol is available at Rs. 8 per litre, while non-molasses alcohol is priced at Rs. 30 per litre. At present, ten non-molasses based distilleries are closed.

Mixed Trends in Exports of Agricultural and Allied Products

Helped by a healthy growth of 42% during April-February 1995-96, the share of agricultural and allied products went up to 19% from 16% in the same period of 1994-95. Major export gains in this group were in non-basmati rice, coffee, sugar, castor oil, wheat and meat and meat preparations. Export of these six commodities was higher by \$ 1,330 million. They accounted for 84% of the total increase in exports of agricultural and allied products, with non-basmati rice alone notching up a share of 59%.

Export performance of marine products, cashew, basmati rice, tobacco manufactured spirit and beverages was poor. These commodities recorded decline in their exports over the previous year. Export of marine products was lower by 10%, while decline in export of cashew was 9%. These two commodities together accounted for 4.4% of India's

total exports during April-February 1995-96.

Non-basmati Rice

During April-February 1995-96, foreign exchange earnings from export of non-basmati rice increased to \$998 million from just \$68 million in the same period of 1994-95. This reflects a hefty increase in export volumes. Export of non-basmati rice was 4.68 million tonnes during the period against just 0.26 million tonnes exported in the same period of 1994-95.

Revenue realisation from exports of non-basmati rice was \$213 per tonne during April-February 1995-96. This was lower by \$42 per tonne, compared with \$255 per tonne realised during the same period of 1994-95.

Major importers of Indian non-basmati rice were Indonesia and Bangladesh. These two countries accounted for one-half of total exports of the rice from India. The largest gain in export during April-February 1995-96 was also recorded in Indonesia and Bangladesh. Exports to Indonesia increased by \$ 245 million, this was 24.5% of the total increase. Similar increase was recorded in non-basmati rice exports to Bangladesh. (See Data Bank)

Other major markets which are not listed in the table above were Russia, Sierra Leon, Iran, South Korea, Togo and Peru. Together, exports to these countries amounted to \$100 million i.e., 10% of the total exports.

Marine Products

Marine products were the second largest exchange earner in the agricultural and allied products group during April-February 1995-96. In 1994-95, it was the largest. In the current year, its contribution

to the export of agricultural products declined to 17% from 27%.

During April-February 1995-96, exports of marine products declined by 10% over the same period of 1994-95. Export to five out of ten major markets for Indian marine products was lower than in the previous year. These markets were Japan, USA, Singapore, Hong Kong and Belgium. These five markets had consumed 66% of the total exports during April-February 1994-95. In 1995-96 (till February), the share of these countries declined to 59%. Japan normally consumes more than 40% of India's total marine exports. Exports to Japan recorded a 16% decline. (See Data Bank)

Few other major markets which are not mentioned in the table were Thailand, Greece, Malaysia, China and France. These five countries consumed 8% of the total exports in 1995-96 (till February). Export to these five countries amounted to \$ 87 million during April-February 1995-96. It was lower by 20% compared with the export in the same period of 1994-95.

Karnataka Sales Internationals to Distribute Indian Made Foreign Liquor

The Government of Karnataka has decided to channellise the distribution of Indian Made Foreign Liquor (IMFL) through a new company, Karnataka Sales International. This would prevent evasion of excise. It is expected that

mobilising additional resources through the prevention of evasion of excise will make up for the losses in revenue due to selective prohibition. Excise contributes close to Rs. 750 crores a year to the State exchequer. Prohibition, first of arrack and then of liquor in a phased manner, will remove the source of revenue. The current distributor is Mysore Sales International.

Export-Oriented 100% Fruit Processing Unit at Tirupathi

A new entrant in fruit processing sector 'Vinsari Fruitech' is setting up a 100% export-oriented fruit processing unit near Tirupathi, Andhra Pradesh. With an installed processing capacity of 22,000 tonnes / yr, the unit is expected to start commercial production by July 96. Products include tomato paste and fruit juice concentrates (mango, papaya, guava and tomato) 50% of which will be marketed by the company and the rest by Netco exports. SASID Foods of Italy is providing the entire technology and machinery on turnkey basis. Total project cost is estimated at Rs. 15.77 crores of which IDBI and SBH are providing Rs. 6.88 crores as term loan and the rest of the investment is through promoters (Rs. 3.8 crores) and public issue (Rs. 4.59 crores).

Counting Chickens

The C&M Group, which was operating with just 200

birds in 1961 has increased its poultry strength to 1,50,000 birds in 1995. This company holds a franchise of Hubbard Farms of the US, a pioneer in the field of broiler genetics. Presently, the company has about Rs. 100 crore business through its 8 units on a 240 hectares of land near Nasik. Their operation is mainly in Maharashtra, Baroda and Silvassa and intend setting up farms in Goa, Bangalore, Diu and Bhopal. Another project on a 600 hectare land is coming up near its main Nasik project.

The company has stated that every stage in their hatchery / poultry units is carefully timed. The chicks spend ten weeks in a 100 meter long, 5.5 meter wide 'tunnel house', developed by the company to ensure a temperature of 11°C lower than outside during the peak summer. Further, they will be kept for 10 weeks in grower house before moving to the layer house, and finally subjected to culling, when they are 68 weeks old. About 100 veterinary doctors oversee the operations on various farms. With this system, their production is a good 10% higher than the Hubbard standard of 170 to 175 over one 45-week laying cycle.

DCM to Diversify into Sugar Business

DCM Shriram consolidated Ltd. is diversifying its activities into sugar manufacturing business. They have earmarked Rs. 200 crores for investment in sugar business. Also, they have planned to set up a sugar unit near Haridwar in U.P. The plant will have an installed capacity of 3100 tonnes per day and likely to increase it to 6000 tonnes per day in about three years.

Coca Cola's Fresh Investment Plans

Coca Cola, the global soft drink giant would like to exploit the enormous potential of the Indian market in different varieties of products. According to a study, the soft drink consumption in India is just three ounces per person as compared to 7 ounces in Pakistan, 100 ounces in Philippines, 150 - 200 ounces in Europe and over 300 ounces in North America.

In view of this, the company recently experimented with the launch of 200 ml bottles in Meerut, UP which met with good response. So also, one litre bottles in Delhi had good impact.

The company has a plan of investing \$ 700 million for expanding Indian market over the next 10 years. The company also had an overwhelming response to canned Coca Cola, Thums Up and Limca, produced through their canning unit at Pune, having a capacity of 1100 cans per minute.

Kool Breweries' New Venture

The Kool Breweries of India in collaboration with Germany's Hofbrauhaus, Munich is setting up a new brewery at Dharuhera, Haryana with an investment of Rs. 30 crores. The beer would be produced according to the German purity law-sans chemical additives and only with malt, hops, yeast and water. The annual capacity of the plant would be 1,50,000 hecta litres, and the new brand

of beer would be available in the market by about November 1996.

Parle Agro's New Drink

The Parle Agro group has launched their new drink 'Joly Jely' in Pune recently. This is a pure vegetarian jelly drink in Europe some years ago. This drink is packed similar to 'Frooti' in tetrapak. The company has a capacity to produce 6000 tetra packs per hour and is priced at Rs. 6.50 per pack, same price as Frooti.

JK Dairy Registers 50% Rise in Sales

JK Dairy and Foods Ltd. (JKDF), a part of the JK group has registered a growth of 50% in sales of their products from Rs. 33.06 crores to Rs. 50.29 crores for a nine month period from July 1995 to March 1996.

Umang Pure Ghee and skimmed milk powder and Dairy Top Instant, Dairy Powder are their brands that have caught up with the masses in the market.

Shaw Wallace to Launch New Liquor Brands

The Manu Chhabria - controlled Shaw Wallace Ltd. (SWL) plans to take advantage of the growing popularity of white spirits by launching new brands.

The white spirit segment includes Vodka, Gin, Plremixes and White Rum. The company

has already diversified into white spirit sector with its "White Mischief" brand of Vodka.

Vintage Foods to Set up Integrated Dairy Complex

Vintage Foods and Industries Ltd. (VIFL) proposes to establish a full fledged integrated dairy complex with an installed capacity of 1,75,000 litres of milk a day to produce about 10 tonnes of cheese daily and other milk products like market milk, yoghurt, *paneer* and flavoured milk.

The project is to be located at Gokere village in Bangalore district. The cost of the project is estimated at Rs. 1350 lakhs.

Vazir Sultan Tobacco Exploring US Processed Food Market

The Vazir Sultan Tobacco (VST) company, makers of the Charminar brand of cigarettes, is now looking to an area of more robust growth - processed food.

Forced by its shrinking market share, the company is telling the roughly 35,000 farmers, who have supplied tobacco for over 30 years, to grow vegetables along with tobacco, for its Natural Products Division, a new food processing plant in Medak, near Hyderabad.

As part of its foray into the processed food market, the company is negotiating tie-ups with big groups to sell its latest line of products in the US and

Canada, namely paprika (sweet chillies), Indian chillies, turmeric, herbal spices such as oregano, parsley, basil and dehydrated onions.

VST is focussing on two broad product categories - acidified vegetables, and spices and herbs. The market for acidified vegetables in the US is worth \$ 1.5 billion, of which gherkins occupy about 85 per cent. VST was aiming to sell its products to large food processors in America and Europe.

VST's tobacco division has an annual sales turnover of Rs. 6.6 billion (about \$185 million) and it expects its Natural Products Division to touch sales to the tune of 6 million dollars in 1996. The company is concentrating on export of spices and has already made trial shipments of paprika to Israel and established contacts in the markets in Spain, US and Europe. The company's current level of exports of paprika is \$850,000, and this is expected to increase four-fold in the next two years with the addition of oleoresins.

VST aimed to "corporate" the production of specified food crops by investing heavily in seed technology, and this was also what India will have to do to develop the food processing

section, according to the Managing Director of VST.

New Filtration Method to Improve Sugar Recovery

Indian sugar technologists are currently testing an efficient solid-liquid separation system, which they claim can replace conventional bulky rotary vacuum filters and reduce sugar lost in residues by about half.

Plant scale trials carried out at a sugar factory in Valsad have shown that the new filter can retain solids up to 98 per cent compared to 60-70 per cent achieved with the traditional vacuum filters, said J.J. Bhagat, Mission Director and Co-developer of the system.

According to Mr. Bhagat, a large number of sugar mills in the country have been using inefficient vacuum filtration method for the last 25 years to desweeten the residue discharged from the extraction plant.

Though this conventional system, consisting of a rotary vacuum filter fitted with perforated screens, requires very

little manpower, it has serious bottlenecks such as low solid retention, high sugar loss in flitter cakes, juice contamination and environmental pollution.

The last two drawbacks are due to mixing of underflow from the clarifier with fine bagacillo to aid filtration and its subsequent recirculation with raw juice from the extraction plant. Mr. Bhagat and M.P.N. Pastakis of the Bombay-based sugar company, Pennwalt (India) Ltd., who were searching for an economically-viable substitute for the present filtration system found that fertiliser, petrochemical and paper industries are using a decanter centrifuge-based system for solid-liquid separation.

Subsequently, they tailor-made a similar system, based on the familiar principle of centrifugal force, appropriate for sugar mills. "The new filter can retain up to 95 per cent solids in the juice. This means an increase of about 1 per cent in total quantity of sugar produced," Mr. Bhagat said.

"This percentage may be small, but in real terms it is substantial gain, given that India's sugar production in the previous financial year was about 147 lakh tonnes," he claimed.

FEATURE ARTICLES



**Tailored Plastics Film Laminates for
Modified Atmosphere Packaging of Fresh Fruits
ISO 9000 and Environment Management System**

Geriatric Foods - A Fad Or A Need ?

The Mad Mad Cows

Fat Spread - A Changing Face

**Status and Prospects of Soybean Industry
in India**

Tailored Plastics Film Laminates for Modified Atmosphere Packaging of Fresh Fruits

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Introduction

With the annual production of over 32 million tonnes of fruits (1994-95), India has emerged as the largest producer of fruits in the world (Chadha 1995). However, the estimated post-harvest losses due to improper handling, packaging and storage of fruits go as high as 30%. It amounts to losing about Rs. 30,000 millions annually. Recognizing both, the need to minimize post-harvest losses as well as the high export potential of horticultural produce, Government of India, has laid emphasis on quality and productivity of horticultural crops with major thrust on the development of packaging and storage technologies.

Fresh fruits are considered as an integral part of any dietary system, since they are the rich sources of minerals, vitamins and dietary fibres. Hence, fresh fruits always enjoy good market demand. However, fruits, in general, have short shelf-life.

They begin to lose their orchard-freshness, shortly after they are plucked from the tree. Mere protection from mechanical damage and microbial infection keeps the fruit in sound condition only for its normal season. It does not increase

Fresh fruits are considered as an integral part of any dietary system, since they are the rich sources of minerals, vitamins and dietary fibres.

shelf-life of the fruit beyond its normal season. This is because of the metabolic processes, which continue even after the fruits are detached from the tree. Among these, respiration is considered to

be the major catabolic process, which brings about natural ripening, senescence and subsequently, the deterioration of fruit in its normal course of time.

In the process of respiration, O₂ from the surrounding atmosphere is consumed by the fruit, while CO₂ evolved by the fruit is given out to the surrounding atmosphere with concurrent release of some energy often as heat. Respiration involves oxidative breaking down of respiratory substrates (viz., carbohydrates, organic acids and other reserves) to CO₂ and water through a series of reactions, where each reaction is catalyzed by a specific enzyme. In this series of oxidation-reduction reactions, molecular O₂ acts as the final electron acceptor and is reduced to water. Hence, restricting the availability of O₂ to the fruit retards oxidative reduction of the substrates, which generally results in increased shelf-life of fruits

Lowering of fruit temperature also reduces

respiration significantly by diminishing enzymatic activities, whereas exposing the fruits to high CO₂ levels inhibits respiration, though, to a small extent. Thus, temperature and composition of storage air, particularly, the concentration levels of O₂ and CO₂ are the major storage factors, which can be manoeuvred to keep the fruit in pristine condition as far beyond its normal season as practical. However, there are critical levels of O₂ and CO₂ concentrations. Modification in storage air composition beyond these critical levels induces physiological and microbial disorders (Moleyar and Narasimham 1994). Devoiding storage atmosphere completely of O₂ induces anaerobic respiration, which produces ethanol. It imparts off-flavour to the fruit, and thus reduces its consumers' acceptability. Likewise, CO₂ levels higher than the critical levels injure the fruit, rendering it unfit for prolonged storage. These critical levels need to be determined specifically, since they vary with the type of fruit, the cultivar and the geographical region (Delgado 1978).

Fresh fruits retain orchard-freshness longer, when stored in a modified atmosphere, where the recommended levels of O₂, and CO₂, humidity and temperature are maintained. In Controlled Atmosphere (CA) storages, besides temperature, the concentrations of O₂ and CO₂ in storage air are also controlled to maintain the recommended levels. For this purpose, the composition of storage air is continually monitored and adjusted throughout the period of storage. It involves sophisticated and bulky equipment. The involvement of sophisticated equipment makes CA storage technology cost-intensive, whereas that of bulky equipment limits its application during

transport, retail storing and marketing. CA stored fruits deteriorate rapidly in normal air during post-storage period. It

Lowering of fruit temperature also reduces respiration significantly by diminishing enzymatic activities, whereas exposing the fruits to high CO₂ levels inhibits respiration, though, to a small extent.

assumes greater concern in view of the existing transport, market and retail store facilities in India where fruits are commonly transported, marketed and retail stored under ambient conditions or, at best, at low temperatures in normal air.

The developments in packaging materials, particularly, the advent of permselective plastics films have widened the scope for developing Modified Atmosphere (MA) packaging system for storage of fresh fruits.

The developments in packaging materials, particularly, the advent of permselective

plastics films have widened the scope for developing Modified Atmosphere (MA) packaging system for storage of fresh fruits. In this system, fruits are sealed in retail size permselective plastics film packages called Modified Atmosphere Packages (MAP). In a properly designed MA package, as a result of respiration of the packaged fruit and restricted gas permeation through the packaging film, the composition of package air gets modified automatically. Thus, unlike CA storage, the recommended air composition is self-established in MAP. It obviates all those equipment, which are otherwise required for maintaining recommended air composition. This, apart from reducing storage cost, makes MAP technology applicable to the entire chain of fruit distribution right from orchard to ultimate consumer.

However, for accomplishing self-establishment of recommended air composition in MAP within a stipulated time, optimization of various package parameters as well as tailoring of film laminate are essential. In this article, various aspects of MAP design including a novel method of tailoring film laminates have been described.

Dynamics of Gaseous Exchange in MAP

MA package is considered as a dynamic system, where respiration and gas permeation continue to take place simultaneously (Floros 1990). During respiration, packaged fruits take O₂ from package atmosphere and give away CO₂ to the package atmosphere. Due to respiration of the packaged fruit, O₂ starts depleting and CO₂ starts accumulating within the package. Consequently, respiration begins to decrease, while O₂ and CO₂ concentration gradients between package

atmosphere and the atmosphere surrounding the package, begin to develop. As a result, O₂ starts permeating into the package and CO₂ out of the package. However, the rate of gas permeation depends upon permeability coefficient of the film, its surface area and the gas concentration gradient across the film (Nemphos *et al.*, 1976).

In MAP, with the increase in concentration gradient, gas permeation increases and respiration of the package fruit decreases. The increase in gas permeation as well as the decrease in respiration continue till an equilibrium is reached, where O₂ consumption and CO₂ evolution of the packaged fruit become equal to the O₂ ingress and CO₂ egress of the package, respectively. The package is then said to be in dynamic equilibrium with the surrounding atmosphere. Once established, the equilibrium gas concentrations remain nearly constant throughout the stipulated period of storage.

However, in MAP, it is possible that the dynamic equilibrium may arrive at such levels of O₂ and CO₂ concentrations which are deleterious to the fruit or the equilibrium may not arrive for considerably long period of time. Hence, it is important that the MA package be designed properly and that the design facilitates prediction of package equilibrium conditions as precisely as possible.

Design Aspects of MA Package

In a properly designed MA package, it is expected that the dynamic equilibrium establishes at the recommended levels of O₂ and CO₂ concentrations in the package atmosphere, and that the time required for establishing the equilibrium be as small as practical (Prasad *et al.*, 1995).

For designing a package which satisfies the said conditions, it becomes imperative to study the dynamics of respiration-permeation interaction in MAP.

In MAP system, the net exchange of gas components at dynamic equilibrium is zero. Several investigators have represented mass balance of O₂ and CO₂ in MAP mathematically (Hayakawa *et al.*, 1975 ; Mannapperuma and Singh 1987 ; Cameron *et al.*, 1989). The mathematical equations of mass balance are employed for optimization of various package parameters such as fill-weight, surface area and free-volume of the package. Fill-weight : surface area ratio as well as free-volume of the package vary with the shape, size and bulk density of the fruit. Hence, they need to be optimized for specific commodity (Prasad and Singh 1974). For the package to qualify as carry-bag, the weight as well as the size of the package are to be kept within a range, which satisfies the requirements of a carry-bag.

Mass balance equations satisfying equilibrium conditions are employed for calculating the gas transmission requirements (GTR_{eq}) of MAP, particularly, the O₂ and CO₂ transmission requirements. Packaging film or film laminate, whose gas transmission rates (GTR) satisfy GTR_{eq} of MAP, is then selected for preparing MA packages. Besides GTR, other properties of the packaging film such as light transmittance, tear strength, puncture resistance, heat sealability and printability are also considered.

Tailoring of Film Laminates

For MAP packaging, film laminates are developed with the objective of bringing GTR of the laminates as close to the gas transmission requirements of MAP as practical. The attainment

of dynamic equilibrium at predetermined conditions is possible, provided the GTR of packaging film match with the gas transmission values required for MAP. However, in most cases, the gas transmission characteristics (GTC), particularly, the O₂ transmission rate (OTR), CO₂ transmission rate (CTR) and CTR/OTR ratio (TR) of packaging film do not match with the GTR_{eq} of MAP satisfactorily. In such cases, it becomes imperative to modify the GTC of packaging films to suit gas transmission requirements of MAP for specific commodity as the gas transmission requirements of MAP vary with the commodity, in general.

In case of polymeric films, GTC vary with the morphology of the film, particularly, the amorphous and crystalline regions, degree of crystallization, density and the distribution of amorphous regions, orientation, draw ratio, draw temperature etc. These parameters can be varied within limits to alter the GTC of the film. However, the resulting changes in GTC are generally small (Koros 1989 ; Pugh 1993 ; Taraiya *et al.*, 1993). Unfortunately, the scope of obtaining predetermined values of GTR by manoeuvring various process parameters is extremely limited.

Various aspects of MA packaging of apples, tomatoes and bananas have been investigated in authors' laboratories. In a case study, the required TR value of a packaging film for MA packaging of Red Delicious apples was found to be around 7 (Prasad 1995). The TR values of available films were found to be much lower than 7. In case of high barrier films [i.e., Saranex - 15 (100 µ); Barex (60 µ) ; PET (100 µ)], the TR values were found to vary between 2.5 and 4, though, their OTR values were close to the OTR requirement of

MAP. In low barrier films [i.e., plasticized PVC (25 and 30 μ); BOPP (30 and 40 μ); LDPE (25 μ)], the maximum TR value was found to be around, 5 while their OTR values were much higher than the required ones. The laminates of low and high barrier films were also found to have GTC different from those required for MAP.

To overcome this problem, a novel method of tailoring the film laminates was developed (Prasad 1995). In this method, two or more films, preferably, low and high barrier films are combined to form the laminate. Before combining, the effective surface area of one of the two films as well as that of the laminated portion is optimized. The films are then tailored to make their optimal surface areas effective, when combined to form the laminate by adhesive lamination process. Compatibility of the adhesive with the films is of vital importance for adhesive lamination.

Tailored film laminates (TFL) were found to have met GTReq of MAP for apples, satisfactorily. Packages made of TEL established dynamic equilibrium at recommended conditions. The shelf-life of MA packaged apples was found to have increased by 2.25 times at 15°C and that the economic gain, by about 1.5 times. The tailored film laminate of PVC (25 μ) and BOPP (40 μ) was found to have performed the best, whereas that of PVC (25 μ) and Saranex-15 (100 μ), the second best.

Conclusions

MA packaged fruits retain orchard-freshness for longer periods even at such temperatures, which are a few degree higher (10-12°C) than those employed in refrigerated storages (2-4°C). However, while designing MAP, GTC of packaging films impose severe

limitations. These limitations can be removed to a great extent by tailoring the film laminates. By tailoring, the GTC of packaging film laminates can be brought as close to the gas transmission requirements of MAP as practical.

MAP system can be employed easily in the existing infrastructure of fruit storage, transport and marketing in the country. With the increasing application of MAP technology, fruits as well as vegetable packaging and storage sector would emerge as one of the largest consumers of plastics films in the near future. Thus, it

MAP system can be employed easily in the existing infrastructure of fruit storage, transport and marketing in the country.

is important that a proper system of recycling or safe disposal of used MA packages is developed with a view to minimizing environmental pollution for maintaining the ecological balance.

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ISO 9000 and Environment Management System

SOHRAB *

Quality Care, New Delhi.

Introduction

Environment sustains life on earth. Degradation of environment has, therefore, become one of the biggest issues before the human kind, as it threatens the human race. The fallout of technological explosions, unrestricted industrialization, deforestation and nuclear tests have enormous impact on the biosphere. Therefore, a need for preservation of environment was felt more towards the beginning of 1970's, especially with the declaration for "sustainable development" by the United Nations Conference on the Human Environment adopted at Stockholm on 16, June 1972.

The foundation for an integrated preventive approach to environmental protection was laid through the milestone report of the World Commission on Environment and Development in 1987, which emphasized the importance of environmental protection for sustainable development. The International Chamber of Commerce (ICC) evolved a Charter of 16 principles for environmental management in 1990, which were adopted by the World Industry Conference on Environment Management in 1991 (See Annex 1).

But, it was the United Na-

tions Conference on Environment and Development held in June 1992, during which the goal of establishing a new and equitable global partnership was set through the creation of new levels of cooperation among the countries, key sectors of societies and people, working towards international agreements, which respect the interests of all and protect the integrity of the global environmental and developmen-

Excess use of natural resources without commensurate replenishment leaving a void weakens the natural harmony.

tal system. This triggered off a world wide awakening on the importance of preservation of environment and prevent degradation to make the earth a safe place to live.

The environmental degradation is linked with industrialization. Excess use of

natural resources without commensurate replenishment leaving a void weakens the natural harmony. A sustainable development assumes that as an integral part of environment, a manufacturing or service organization should not offload quantities of pollutants, which overtax the regenerative capacity of the ambient receiving media namely, air, water and land. To preserve the environment, urgent steps are needed to effectively manage the pollution loads let out in the environment by industries and urban settlements.

An important consequence of this perceived need for environmental protection has been a proliferation of environment-related statutory and regulatory requirements and a growing number of product-related environmental standards. Environmental management, however, as the totality of environment-related activities of an organization, involving all its personnel within the framework of an environmental management system (EMS), has only recently begun with keener interest.

Today, the world has adopted a quality management system, based on the ISO 9000 series of international standards brought out by the International

* Chief Executive,

Organization for Standardization (ISO) to harmonize practices and channelize activities towards upgradation of quality goods and services. There are more than 85 countries, which have adopted these international standards and over 95000 enterprises have been certified against them.

These are generic standards applicable to organizations across the board - be it industrial activity or be it service activity, encompassing all services like transport, communication, financial utilities and the whole gamut of associated services.

There is a persistent growing demand for demonstrating the effectiveness of environmental management systems. This issue is becoming increasingly important throughout the world. To meet this demand, some countries have prepared / are preparing national standards on EMS. The Bureau of Indian Standards which is the national standards body of India has brought out IS : 13967 - 1993 Specification for Environmental Management System. The trend to deal with environmental management system away from Quality Management System may not help integrated approach to EMS. Since these two are intertwined and closely linked activities they should be dealt with together in a co-ordinated manner.

Genesis of the Problem

It must be seen how various human activities result in degradation of environment. The organizations engaged in industrial, commercial or service activities supply tangible or intangible results of their network of activities and processes.

These results are :

- a) product or service offered to customers to satisfy their stated or implied needs.
- b) tangible or intangible by-products or incidental out-

puts, such as wastes, emissions, depletion of natural resources (air, energy, land, water). These incidental outputs in comparison with the intended products or services that are the main objectives of the organization, are largely unintended.

These results of human activity impinge on the environment, either immediately, during use, or after disposal, and their effects may be adverse or beneficial. Ever increasing complexity and continual expansion of the activities and processes, resulting in increased environmental risks and damage generated relentless and ever increasing pressures on industry. These have given rise to more stringent legislations to promote environmental protection and to increasingly critical demands from interested parties :

- a) regarding quality of the

In today's ever increasing competition, organizations are applying effective and efficient management systems techniques, sustain satisfactory economic capability and achieve good environmental performance.

product or services, with greater emphasis on quality characteristics that relate to their effect on the environment;

- b) regarding the quality of the incidental outputs, which relate to their environment-related quality characteristics; and

- c) regarding the overall quality of an organization, with increased consideration given to

all environmental aspects, such as environmental capability and its demonstration to environmental preservation.

In today's ever increasing competition, organizations are applying effective and efficient management system techniques, sustain satisfactory economic capability and achieve good environmental performance. The aim of such management systems is to ensure continuous improvement in quality and performance to meet the demands of its stake holders such as, customers, society, employees, owners, sub-contractors to their increasing satisfaction.

The more enlightened stake holders often rely on technical specifications to indicate their expectations and requirements with regard both to outputs and particular processes. However, such technical specifications cannot by themselves ensure that these requirements are met consistently, if there are deficiencies in the organizational system for the supply and support of the outputs. It is this aspect that has prompted the preparation of guidelines and standards containing quality management system requirements, which complement the product requirements given in the technical specifications. The ISO 9000 series of standards on quality management systems fall in this category. These standards provide guidance on the establishment of quality management systems and specify sets of demonstrable requirements, which may be applied to consistently meet stake holders' requirements.

The quality management system is an obvious step to the objectives of environmental management. This is the reason why there is a growing realization that the management principles and methods to be implemented are essentially similar. Therefore, quality management and environmental

management should not be seen as two distinct disciplines. The main reasons for their being treated distinct are :

a) Quality management system concentrates on the satisfaction of the customer and the economic success of the organization. To achieve this, main emphasis is to meet customer requirements. This approach also necessitates the fulfilment of statutory and regulatory requirements pertaining to the environment.

b) Environmental management concentrates on the fulfilment of all external and internal environmental requirements to be met both by product or service and by all incidental outputs to ensure "sustainable development".

c) The management of organizations quite often, regard environmental aspects as being distinct from quality aspects and fail to establish policies that co-ordinate the two.

d) Specialist group engaged in QMS and EMS are different and often work under different set up.

e) Inconsistencies between the specialist terminologies used, help to achieve the objectives.

These factors led to the development of psychological barriers. It is, therefore, necessary to remove such barriers by a common understanding that the applicable principles, methods and tools of management are, in fact, similar to achieve the intended purposes.

Development of International Standards

The international environmental management standards are intended to provide organizations with the elements of an effective environmental management system, which can be integrated with other management requirements to assist or-

ganizations to achieve environmental and financial goals. These standards specify the core elements of an environmental management system to support environmental protection in balance with socio-economic needs.

Environmental management encompasses a full range of issues including those with strategic and competitive implications. Therefore, quality management and environmental management systems of organizations are closely interrelated and even overlap to a great extent. An attempt should be made to balance the overall architecture of existing standards on QMS and those presently being elaborated on EMS. However, it

Environmental management encompasses a full range of issues including those with strategic and competitive implications.

was not possible to achieve this objective within a short period and the EMS standards are, therefore, likely to differ in structure from the ISO 9000 series of standards. However, the intention of rendering the relevant standards fully compatible in content and form remains an aim of both ISO technical committees ISO/TC 207 on Environmental Management and ISO/TC 176 on Quality Management and Quality Assurance.

The current international standards on environmental management system under elaboration cover the following major areas:

a) environmental manage-

ment system, b) environmental auditing, c) environmental labelling, d) environmental performance evaluation, e) life cycle assessment and f) terms and definitions.

The Chairman Dr. George Connor of ISO/TC 207 Environmental Management has rightly summed up the outcome of the Committee as, "it has been long time to wake up to the reality that environmental management systems are business systems issue, and that business supported by public policy and standards, can be one of the greatest agents of change and improvement of environment."

The demonstration of successful implementation of the EMS standards can be used by an organization to ensure stakeholders that an appropriate environmental management system is in place. This has generated demand for demonstrating the effectiveness of environmental management systems (EMS) and is becoming an issue of increasing importance throughout the world. The response has been, besides statutory or regulatory requirements, for some countries to prepare national standards which are taken as inputs to the standardization activities, now being undertaken at international level. The aim is to achieve harmonization both in the national and the international context. However, there can never be just one standardized form of EMS, as the EMS of an organization will always be an individual configuration, shaped by numerous internal and external parameters and prescripts, such as the stated objectives, the nature of the product offered, the specific organizational structures, and the relative size.

In this respect, the establishment of harmoniously co-ordinated principles within the framework of an integrated management system is a key concern. Conflicts between the commercial and the environmental

targets of organizations can only be resolved at the highest level of management that is responsible for framing such a common policy. Overall management systems that are separated into partial management systems, directed at achieving different objectives create areas of friction that usually result in a less efficient exploitation of the organization's potential. However, the linking of environmental management aspects with the rules of the ISO 9000 series is comparatively new, but consistent with the existing system.

Today, it is probably obvious and a commonplace of day-to-day practice that management activities relating to the environmental aspects of product offerings and their development are not only part of environmental but also part of quality management. In other words, whatever may be its designation, where it is a matter of environmental characteristics of the product offerings and their creation, one system is involved and not two.

Therefore, it is likely that in the long-term, there will be only one series of International Standards on quality management and environment management systems. Also, on economic considerations, organizations may not afford the application of different standards relating to partial aspects of their overall management system. The ISO has evolved a strategy for integration of ISO 9000 and ISO 14000 series. This series is on EMS of standards in the following manner :

a) Short-term goal is compatibility between the ISO 9000 : 1994 series and the ISO 14000 : 1996 series of standards.

b) The medium-term goal is compatibility between ISO 9000: 1999 and ISO 14000 : 1996.

c) The long-term goal is harmonization of all standards between the two series.

To facilitate this eventual

conversion, a joint task force between ISO/TC 176 and ISO/TC 207 has been constituted to meet frequently to ensure that the two committees share the same vision. If the ISO's plans are realized, there would be only one set of International Standards both for QMS and EMS.

Certification of EMS

There is a growing realization that environmental issues could be solved by resorting to certification system. There are two pronged approach-one way is to introduce environmental parameters in product specifications and certify them together

There is a growing realization that environmental issues could be solved by resorting to certification system.

with the product certification schemes called ECO marketing or it could be independent of product specification, but exclusively dealing with environmental issues.

Organizations interested in setting up an EMS for their own internal purposes can use standards, regulations or specialist literature, which suit the organizational objectives. In case, it is desired the EMS to be certified, a suitably documented system for demonstration of requirements is to be evolved. Individual countries have developed their national standards on "Environmental management systems ; these are as model for demonstrating the environmental capability of an organization". The certification of QMS to comply with ISO 9001,

ISO 9002 and ISO 9003 by independent certification bodies has become widespread practice throughout the world. But certification of EMS is still in its early stages of development. It is possible that the ISO 14000 series International Standards will serve as a basis for future certifications. If certification bodies offer their services as environmental verifier, they need to be accredited to meet international criteria.

The organizations which have established their QMS and have obtained a certificate will need to include EMS requirements to seek certification on the basis of the regulation or national standards. It would provide a most comprehensive and coherent system for demonstration of EMS requirements, deriving from relevant standardization documents, and QMS demonstration requirements stipulated in ISO 9001 that have a direct bearing on the EMS.

The organization will have optimal use of existing management system for demonstration of framework of the EMS. With regard to the widespread use of ISO 9001, it would be better to use this standard as reference and its structure adopted as a pattern for drawing up the certification system. In fact, the first goal is to have ISO 14000 as a pre-eminent environmental standard. The next goal, further down the line is to join ISO 9000 and ISO 14000 together. This would cut cost and less disruptive to organization, having QMS in place. There is also a significant likelihood that soon after the standards are published, facilities will need to be certified to them.

So, organizations would seem well advised to find out exactly how the environmental standards will affect them in the long run. In reality, this could help managers to get a jump on lining up their environmental management system with the

International Standards. This may even save them from expensive consulting fee for learning even the most basic facts about the standards.

Some countries have already started certification of quality management system on the basis of national standards such as the British Standards Institution which has started EMS certification on the basis of BS 7750, a British standards on environmental system.

Environmental Marking Schemes

Different countries have adopted different measures to promote schemes for environmental protection. One such scheme is labelling system of products to indicate environment friendliness of products. In India, a scheme of ECO MARK has been introduced, which aims at distinguishing any product which is made, used or disposed off in a way that significantly reduces the adverse effect, it would otherwise have on the environment.

The objectives of the scheme are :

- a) To provide an incentive for the organizations to produce environment friendly products,
- b) To reward genuine initiatives by organizations, undertaking to minimize the adverse impact of their operations on the environment,
- c) To help customers to become environmentally responsible by extending their patronage to products, which are environmentally benign, and
- d) Ultimately to improve quality of the environment and to encourage the sustainable management of resources.

The BIS ECO marketing scheme is operated in conjunction with product certification. The environmental requirements have been incorporated in product standards for operation of such a scheme.

Conclusions

If environment is to be preserved to sustain life, protection of environment has to become our way of life. A multi-pronged approach would be required. The statutory and regulatory efforts must be supported by voluntary efforts from standardization, certification, customer awakening and education.

As environment has become a global problem, it must be dealt with globally to avoid imbalanced development. Countries must try to help development of International Standards for environmental management system and use them for their certification sys-

The Indian organizations must take cognizance of the international developments on environmental problems especially those who are operating quality management system to ISO 9000.

tems based on international criteria.

The Indian organizations must take cognizance of the international developments on environmental problems especially those who are operating quality management system to ISO 9000. It is time that the industry gears up to meet challenges of harmonization of QMS and EMS standards to minimize the impact of by-products of product or service offerings.

Mrs Indira Gandhi, the late Prime Minister of India, summed up problem of environ-

ment at the International Conference of Human Environment, Stockholm 1972 as "The environmental problems of developing countries are not the side-effects of industrialization but reflect the inadequacy of development. The rich countries may look upon development as the cause of environmental destruction, but to us it is one of the primary means of improving the environment for the living, or providing food, water, sanitation and shelter, of making the deserts green and the mountains habitable."

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Annexure I

ICC "Business Charter for Sustainable Development"

A. Preamble

There is widespread recognition today that environmental protection must be among the highest priorities of every business. In its milestone 1987 report "our common future" The World Commission on Environment and Development emphasized the importance of environmental protection in the pursuit of sustainable development.

To help business around the world improve its environmental performance, the Executive Board of the International Chamber of Commerce (ICC) on 27 November 1990 adopted a "business charter for sustainable development" enunciating 16 principles for environmental management. It was formally launched in April 1991 at the Second World Industry Conference on environmental management.

B. The Sixteen Principles

1. Corporate Priority

To recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development ; to establish policies, programs and practices for conducting operations in an environmentally sound manner.

2. Integrated Management

To integrate these policies, programs and practices fully into each business as an essential element of management in all its functions.

3. Process of Improvement

To continue to improve policies, programs and environmental performance, taking into account technical developments, scientific understanding, consumer needs and community expectations, with legal regulations as starting point ; and to apply the same environmental criteria internationally.

4. Employee Education

To educate, train and motivate employees to conduct their activities in an environmentally responsible manner.

5. Prior Assessment

To assess environmental impacts before starting a new activity or project and before

decommissioning a facility or leaving a site.

6. Products or Services

To develop and provide products or services that have no undue environmental impact and are safe in their intended use, that are efficient in their consumption of energy and natural resources, and that can be recycled, or disposed off safely.

7. Customer Advice

To advise, and where relevant, educate customers, distributors, and the public in the safe use transportation, storage and disposal of products provided ; and to apply similar considerations to the provisions of services.

8. Facilities and Operations

To develop, design and operate facilities and conduct activities taking into consideration and efficient use of energy and materials, the sustainable use of renewable resources, the minimization of adverse environmental impact and waste generation, and the safe and responsible disposal of residual wastes.

9. Supporting Research

To conduct or support research on the environmental impacts of raw materials, products, processes, emissions, and wastes associated with the enterprise and on the means of minimizing such adverse impacts.

10. Precautionary Approach

To modify the manufacture, marketing, or use of products or services or the conduct of activities, consistent with scientific and technical understanding, to prevent serious or irreversible environmental degradation.

11. Contractors and Suppliers

To promote the adoption of these principles by contractors

acting on behalf of the enterprise, encouraging and, where appropriate, requiring improvements in their practices to make them consistent with those of the enterprise ; and to encourage the wider adoption of these principles by suppliers.

12. Emergency Preparedness

To develop and maintain, where significant hazards exist, emergency preparedness plans in conjunction with the emergency services, relevant authorities and the local community, recognizing potential transboundary impacts.

13. Transfer of Technology

To contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.

To contribute to the development of public policy and to business, governmental and intergovernmental programs and educational initiatives that will enhance environmental awareness and protection.

To foster openness and dialogue with employees and the public, anticipating and responding to their concerns about potential hazards and impacts of operations, products, wastes or services, including those of transboundary or global significance.

14. Compliance and Reporting

To measure environmental performance; to conduct regular environmental audits and assessments of compliance with company requirements, legal requirements and these principles ; and periodically to provide appropriate information to the board of directors, shareholders, employees, the authorities and the public.

Geriatric Foods - A Fad Or A Need ?

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During fifties, sixties and seventies, mushrooming child and adult population provided vast opportunities to the food processing industry to evolve and market an array of spectacular foods to meet the nutritional and pecuniary needs of growing people. Against such a backdrop, dramatic reduction in human mortality and longer life expectancy have been achieved today and the center stage of attention now seems to be shifting to a fast growing segment of population, namely those with advancing age. In the history of mankind, it took more than 600,000 years for the world population to reach a figure of 3 billion by 1982, but the same would cross the 6 billion mark by 2017. In 1970, worldwide we had a population of 290 million beyond the age of 60 years, but the same would cross the 600 million threshold by the end of this century. Between 1970 and 2000, notable shifts in the percentage of people beyond the age of 80 years would have taken place in all the continents (Table 1). By the year 2025, the population of elderly people beyond 60 years of age is estimated at a staggering 1.2 billion worldwide, Latin America and Asia registering a 2- and 3-fold increase respectively during the period. The increased life expectancy consequent to advances in technology, health

care, food and nutrition is presenting a great challenge in terms of understanding the process of aging, special nutritional needs and design of appropriate foods to meet their requirements.

It is hard to define old age in general terms. However, it is now being realised that true old age does not commence until 75 and as per the current medical norms, this is the time, when a

The term "geriatric foods" is commonly used to denote those speciality products targetted at elderly people, but it obviously has a negative emotional impact.

person starts experiencing an erosion of complete independence. Generally after the age of 80, everyone is at least partially dependent on someone or the other for continuing of daily living. Studies on the food needs and nutritional aspects of old age population are still not very prevalent, as they involve

multidisciplinary inputs in health, nutrition, biochemistry, physiology and food related sciences. There are several theories being proposed at the cellular, molecular, hormonal and genetic levels for explaining the aging phenomenon, while influence of pathological and environmental changes also have something to do with aging. According to the present perception, aging in the human beings cannot be ascribed to any single biological process, but it is an inevitable result of a complex mixture of programmed changes influenced by environmental and dietary factors. The interactive mode between food and health is well known and the quality of food available influences the aging process to a significant extent. While good food can minimise the traumatic physiological changes that accompany aging, specially designed foods can provide relief to old age consumers from the discomforts and inconveniences associated with a reduced capability for ingestion, digestion and absorption, resulting from progressive deterioration of organ system in old age.

There are innumerable reports depicting the manifestation of nutrient deficiency in human beings, but such nutrient related disorders are often man-made, more as a result of economic factors,

Table 1. Profiles of change in old age population

Region	Age	% Change (1970-2000)
Latin America	All ages	+119.0
	Over 80 years	+215.5
North America	All ages	+30.8
	Over 80 years	+96.2
East Asia	All ages	+47.8
	Over 80 years	+176.2
Europe	All ages	+17.5
	Over 80 years	+62.4
Commonwealth of Independent State (CIS)	All ages	+17.4
	Over 80 years	+62.5

depriving the people of the required food rather than any innate physiological factors. The need for adequate needs of proteins, calorie sources like carbohydrates and fats, essential amino acids and fatty acids, dietary fibre, vitamins and

There are several theories being proposed at the cellular, molecular, hormonal and genetic levels for explaining the aging phenomenon, while influence of pathological and environmental changes also have something to do with aging.

minerals to prevent precipitation of nutrient-stressed disorders are well documented in literature. What is not known are the special nutritional needs, if any, of people at old age, as very little data are available and in many cases, these data appear to be contradictory or scientifically

not established. It is possible that given the appropriate economic environment, the nutrient availability from foods consumed by old age population is adequate as per internationally recommended dietary allowance norms, but socio-psychological factors bring about distortions in the eating pattern, precipitating malnutrition and under nutrition manifestations.

Significant structural and functional changes do take place in the human body during the progress of aging with time and the extent of these changes is a variable phenomenon depending on individual biological status. Overall, these changes can be described in terms of changes in general appearance, muscular, skeletal and nervous systems, digestion, excretion, reproductive organs and endocrines. As can be seen from Table 2, the residual physiological functions and other vital parameters in the human body at the age of 75 can be anywhere from 17% to 90% as compared to that of a 30 year old person. The skin becomes wrinkled, less elastic and dry. Small blood vessels of the skin show increasing fragility and even small bruises produce echymoses-black and blue spots. The hair tends to turn grey to white. Sweating is considerably reduced. Older persons invariably tend to be bent over

giving a stooped appearance due to weakening of muscles. Practically, no vital functions are spared from the onslaught of aging. Table 3 gives highlights of age dependent physiological and pathological changes in human beings.

As far as food and nutritional aspects are concerned, the changes occurring in senses and digestion are most relevant, influencing the uptake of needed calories and nutrients. Declining vision and decreased dexterity affect the perception, regarding the quality of food. There is a progressive loss of the capacity for taste and smell. The number of taste buds per papilla gets reduced by one third as one ages from 30 to 75 years, while the number of fibres in the olfactory nerve diminishes steadily, making it difficult for old people, especially those living alone to choose the right type of foods. Loss of teeth and use of dentures at old age further restrict the choice of food and the interrelationship of diet,

Significant structural and functional changes do take place in the human body during the progress of aging with time.

mastication, digestive tract functions and general health has long been recognised. Saliva flow decreases with age due to progressive degeneration of salivary glands and this affects both the preliminary digestion of starch as well as the ease of swallowing of food due to insufficient lubrication. Sluggish sensory system invariably leads to consumption of foods with

Table 2. Residual physiological functions and vital parameters at 75 years

Parameter	% residual (compared to 30 years)
Weight	88
Water content	82
Basal Metabolic Rate (BMR)	84
Lung capacity	43
Brain weight	56
Brain blood flow	80
pH buffering capacity of blood	17
Cardiac output	70
Kidney function	69
Nerve conduction	90
Taste buds	36
Nerve trunk fibres	63

higher sugar or salt content which is not considered desirable. Changes in oral mucosa, manifested by loss of elasticity make them more susceptible to oral injuries due to eating of coarse foods. Disturbed esophagus motility often leads to decreased peristaltic response, increased non-peristaltic response, delayed transit time and failure of the lower sphincter to relax upon swallowing. Atrophy of the alimentary canal and slowed down overall digestive process are common in elderly people. With aging, number of absorbing cells decreases reducing the surface area available for nutrient absorption. In old age, acid and pepsin secretions steadily decline affecting adversely absorption of vitamin B₁₂ and iron. The mucosal lining of duodenum becomes thin and some degree of atrophy of small intestine is inevitable with old age, though there is no apparent reduction in the weight or length of the intestine. Relaxation of musculature generally leads to constipation which is compounded by reduced intake of fibre in the diet. Amongst the

macronutrients, absorption of fat appears to be affected significantly in the intestine as

evidenced by increased faecal excretion of undigested lipids in persons over the age of 70. This is attributed to age related impairment of fat resynthesis within the intestinal mucosa. Similarly, age related reduction in pancreatic lipase and bile secretion also may be involved in decreased lipid digestion and absorption. Changes in gastrointestinal functions can affect distribution of normal flora in the bowel. Under healthy circumstances, the concentration of bacteria in the upper intestine is generally less than 10⁵ colony forming units (cfu) per ml of contents, which increase to 10⁷ cfu per ml in the ileum and 10¹¹ - 10¹² cfu per ml in the colon. It is also known that anaerobic bacteria predominate over aerobic and facultative bacteria by a factor of 1000 to 1. One of the consequences of old age is

Table 3. Age-dependent physiological and pathological changes due to aging

Function	Changes
Cells and tissues	shrinking, atrophy and regressive changes such as sclerosis, fibrosis
Skeletal	decalcification of bone, bone loss, stiffening of joints, ligament calcification, reduced collagen elasticity and osmotic swelling ability
Respiratory	decrease in lung and vital capacity, likelihood of calcification of cartilages and emphysema
Nervous system	psychiatric morbidity, break down of brain tissues, less sleep, less memory
Genito-urinary	inflammatory renal pathology, reduced blood flow to kidney, reduced filtration rate, water and electrolytes imbalance
Digestive	difficulties in digestion, intestinal upsets, reduced stomach motility and peristaltic activity, development of gastritis
Cardiovascular	coronary sclerosis, hypertension, disturbance in heart rhythm, decline in heart output
Sense	less sensitivity to touch, pain, odour, taste, reflex action

inadequate protein - calorie intake due to changes in quality and quantity of food consumed, as a result of various reasons cited earlier. Reduced intestinal secretion, hypochlorhydria and sluggish intestinal motility lead to bacterial outgrowth in the upper intestine, mostly of aerobic type and generally, this is considered harmless, as they do not affect the intestinal absorption of nutrients too drastically. However, if intestinal motility is reduced too much, anaerobic colonisation may occur, which in turn, cause malabsorption of carbohydrates, fat, vitamin B₁₂ and proteins. It is recognised that presence of certain strains of *Lactobacillus* bacteria brings about dramatic reduction of levels of deconjugating bacterial enzymes, such as β -glucuronidase, which play an important role in activating carcinogens in the intestinal tract. Reduced consumption of milk in the old age often, because of cost consideration and sometime due to lack of adequate sensory satisfaction can invariably lead to reduction of the effective population of probiotics like *Lactobacillus*. Added to this, reduced ability to take foods rich in fibre that would have afforded added protection against colon cancer make the old age people more vulnerable to this dreaded disease. Dietary fibre, if taken at 25-30 g per day is known to have several advantages, which include reduced risks against such disorders as diverticular disease, constipation, bowel cancer, hypercholesteraemia, etc.

Due to various regressive changes in every part of the body brought about by the process of aging, functions of food such as intake, mastication, digestion, absorption, transport, metabolism, excretion, metabolism and central nervous system are affected and a new discipline seems to be emerging, covering geriatric nutrition and

speciality foods to meet their special requirements. The appetite control centre and peripheral sense organs are progressively affected, influencing the food intake. The alteration in food intake behaviour due to aging affects the pattern of nutrient intake, further accelerating the pace of aging, creating a vicious cycle. The challenge is how to break this vicious circle and provide succour to the increasing numbers of elderly people through appropriately designed foods. Food related changes and

In old age, acid and pepsin secretions steadily decline affecting adversely absorption of vitamin B₁₂ and iron.

their consequences on human beings are summarised in Table 4.

Quantitatively, the macronutrient needs of the elderly people remain poorly defined. Energy requirements appear to be somewhat reduced, compared to those for younger population. But, nitrogen and amino acid needs apparently do not decline per unit body weight with aging. This calls for a diet for the elderly with somewhat higher protein level relative to energy. A protein intake equivalent to 12-14% of the energy intake is thought to be appropriate. Still higher intake of protein may be necessary for people in poor health for meeting the additional burden of tissue maintenance and repletion. Till 1970, it was thought that only four micronutrients differ with respect to their levels of intake for elderly, as compared

to young adults and these were thiamine, riboflavin, niacin and iron. Reduced energy intake with advancing age was presumed to be the basis for their decreased requirements at old age. However, the above presumption was never confirmed by clinical studies with elderly subjects. Recently, some evidence has surfaced to suggest that requirements for vitamins like D, B₆ and B₁₂ may be higher in case of old people and hence need to be provided in their diets accordingly. Also reported is the role of Zn, pyridoxine, folate and tocopherol in improving the immune functions in old people, providing them protection against many diseases.

Recommended Dietary Allowances (RDA) being followed in USA were evolved by the Nutritional Board of National Academy of Sciences in 1989 and there are only four categories of population viz., infants, 1-4 years children, people beyond 4 years of age and pregnant and lactating women for whom RDAs have been laid down. However, US Food and Drug Administration in 1993 introduced the concept of Reference Daily Intake (RDI) which is now being adopted for many nutritional programmes. In several cases of micronutrients, RDI values are much higher than RDA values (Table 5). Probably, such increases are justified because RDA values do not take into consideration the changes in body weight or any other criteria that are associated with aging and therefore no separate allowances have been formulated for older people. Increasing evidence that diet might play an ameliorating role, if not preventive one in chronic disorders associated with aging is compelling enough to think in terms of evolving a separate RDA regimen for healthy old population. Low intake of vitamin C in old age has been

Table 4. Food related changes and their consequences in human beings

Changes	Effect
Reduced work	reduced appetite
Reduced appetite	reduced food intake
Decreased efficiency of appetite centers	inadequate food intake
Reduced vision	improper food selection
Reduced smell	faster satiety
Reduced taste	increased intake of salt, sugar
Reduced vertical mandibular displacement and velocity in mastication, loss of teeth, use of denture	reduced intake of coarse food and resultant constipation increased risk of chronic disorders
Reduced saliva production	risk of oral injury, ulcers
Reduced gastric excretion	less protein in food, faster general deterioration
Reduced intestinal motility	less hunger
Reduced lipase and fat synthetase enzymes	lesser absorption of fat from the diet
Decreased efficiency of appetite centers	inadequate food intake
Impairment of central nervous system	non-coordination of food needs, food selection and intake
Changed intestinal flora	affect nutrition, physiological functions and drug efficacy, increased risk of carcinogenesis

implicated in cancer of breast, cervix, esophagus, lung, oral cavity, pancreas, rectum and stomach. Reduced levels of tocopherol in serum of old people expose them to risks of cancer of bladder, melanoma, pancreas, prostate, central nervous system, colorectum, lung, lymphoma and others. High risk of coronary heart disease is reported to be caused by reduced tocopherol intake, while adequate ascorbic acid levels considerably reduce the risk of mortality due to all causes. Probably, increased generation of oxyradicals in the body and progressive inability to cope up with the situation is caused by reduced intake of known antioxidants like ascorbic acid, tocopherol and beta carotenes. It is known that diseases caused by oxyradicals

include emphysema, cancer, arthritis, atherosclerosis, cirrhosis, stroke, respiratory

distress and cataract.

There are many instances, where small communities, located in some of the remotest areas of the world, are flourishing with longevity of their members as a natural phenomenon. In Georgia (Commonwealth of Independent States), in the Himalayas of India (the Hunzas), in Vicabamba (Ecuador) living beyond 100 years is only but normal with the populations there being self sufficient, leading active, toiling existence away from pollution and all that embodies the modern civilisation. However, for a variety of reasons, a percentage of the elderly in both developed and developing countries, especially those in the urban regions are exposed to the risk of some degree of malnutrition and specific vitamin deficiencies. This problem is further compounded by poor dietary intake especially by those in the low socio-economic status, elderly persons living alone or physically inactive or socially isolated. Preventive measures in terms of suitable environmental adaptation including appropriate planning and designing of food to meet their special needs can add healthier years to living.

Table 5. Possible profile of micronutrient needs for aged populations as reflected in RDI of US-FDA-1993

Micronutrients	RDA of US-NAS	RDI of US-FDA	RDI as % of RDA
Folic acid (µg)	200	400	200
Cyanocobalamine (µg)	2	6	300
Pantothenate (mg)	7	10	143
Biotin (µg)	100	300	300
Tocopherol (IU)	15	30	200
Iron (mg)	15	18	120
Calcium (mg)	1200	1000	83
Phosphorus (mg)	1200	1000	83
Copper (mg)	3	2	67
Riboflavin (mg)	1.8	1.7	94

RDI of US-FDA values are suggested as basis while designing Senior foods for consumers beyond the age of 60 years.

Table 6. Design considerations in product development for elderly

Handicap	How to overcome
Poor vision	more colourful presentation of the product
Poor sense of smell	products incorporating higher levels of flavours
Less taste buds	possibility of safe synthetic sweeteners to augment normal sugar levels, possibility of using mixtures of KCl+NaCl for meeting increased threshold from safety angle
Loss of teeth	softer textured foods
Less secretion of digestive juices	foods with higher moisture, finer particle size, predigested foods
Frequent constipation	increased fibre intake through high fibre containing products with lower percentage of coarse particles
Changes in colon microflora	use of fructo-and galacto oligosaccharides in foods, increased intake of milk, dairy products
Reduced fat absorption and resynthesis	Low fat products but with adequate essential fatty acids, increased protein levels
Increased need for folate, cyanocobalamine, pantothenate, ascorbic acid, carotenes, tocopherol, calciferol, calcium	fortified foods with micro-nutrients
Increased susceptibility to infections due to immune dysregulation	Zn-supplemented foods

While designing such foods, factors which need to be considered are summarised in Table 6.

There appears to be a necessity for designing and producing easy to prepare, enjoyable foods high in nutrient density and with high hygienic standards targetted at old age consumers. Food industry may be able to meet the challenging task of providing the nutritional needs of elderly people by manufacturing at reasonable cost a variety of small packs of nutritious instant and convenience foods, easy to open and store and attractive at first

sight with appropriate and acceptable flavour, texture and colour. This will enable the elderly to regularly eat healthy and tasty meals besides giving them the much needed psychological satisfaction. Business-wise, the industry should be looking at a market size, even at the current reckoning, of the order of \$ 60 billion, assuming an average annual per capita purchase of \$ 100 by this group of consumers.

The term "geriatric foods" is commonly used to denote those speciality products targetted at elderly people, but it obviously has a negative

emotional impact. Geriatrics, first coined by Dr. Ignatz Nascher during World War I is based on the Greek words for old age, but for the physician, this elegant label is often understood only in terms of medical work among elderly, chronically sick and incurably disabled people equating it with misery and gloom. Even today, the Discipline of Geriatrics encompasses that branch of General Medicine concerned with the clinical and social aspects of acute and long term illnesses, the prevention of invalidism and disability and the care and treatment of appropriate illness in the elderly. It is time this concept is changed and the need for specially designed foods for old people, healthy as well as those affected by one or the other form of ailment is recognised. Probably, the food processing industry should strive to redefine its responsibility to this segment of population by coming up with more variety of products, based on current knowledge of their nutrition and handicaps. Possibly, the consumers belonging to this strata of society can do with a change of terminology for such foods from geriatric to senior foods, lending it some degree of respectability and normalcy. Further, it is emotionally satisfying to dissociate them from the medicinal discipline, which invariably is linked to diseases and ill health. Senior foods are here to stay, fulfilling a need in the emerging society and cannot be considered a fad anymore. We owe to our Senior Citizens a commitment to provide them with freedom from avoidable ill health and the consequent trauma and freedom from undue dependence externally, in addition to the four basic ones espoused by F.D Roosevelt, viz., freedom of speech, freedom of worship, freedom from fear and freedom from wants.

The Mad Mad Cows

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[In recent months bovine spongiform encephalopathy (BSE) also known as "mad cow disease" made headlines in world news. This article gives an account of the problem, how the disease is caused, symptoms and its effects on world beef market as also human health and ponders over its possible impact in India].

Bovine Spongiform Encephalopathy (BSE) is a fatal disease that attacks the central nervous system of cows. The disease was first reported in Britain in the late 1980s in Hosetein dairy cattle and is characterised by degeneration of the brain. BSE infected cattle show no sign of illness, until very late into the disease. Animals become very sensitive to even normal stimuli; they become edgy, apprehensive and uncoordinated in movements. Epileptic fits and random jumping around progress to aggressiveness and frenzied behaviour are the other symptoms. They become unpredictable and dangerous to handle. Hence the epithet "Mad Cow". They die or are slaughtered. BSE has characteristics in common with a group of fatal CNS diseases like Scrapie in sheep and goats, chronic wasting disease in mule deer, transmissible mink encephalopathy and human diseases like Kuru and Creutzfeld-Jakobs Disease (CJD). These are progressively degenerative diseases for which incubation period is several years.

From the time the veterinarians at the Ministry of Agriculture's Central Veterinary Laboratory in Weybridge, Surrey, UK, first described and named the disease in 1987, a total of 158882 cases of mad cows, occurring on 33292 farms have been confirmed till June 1996. At its peak in 1992, an average of 700 cattle a week were succumbing to BSE and now the rate so far in 1996 is about 70 a week. The affected cattle are destroyed. An estimated annual revenue of 12 million pounds

Bovine Spongiform Encephalopathy (BSE) is a fatal disease that attacks the central nervous system of cows.

sterling brought into the British exchequer through the beef industry is at stake.

The investigations by the Central Veterinary Laboratory, UK, showed that parts of the brain of BSE cows were full of holes or vacuoles giving it a spongy appearance. These vacuoles prevent the passage of nerve impulses. Electron microscopic studies on the affected brain tissue showed the presence of proteinaceous fibrils reminiscent of those seen in

Scrapie. The agent causing BSE was a mysterious entity attributed to unconventional agents, neither bacteria nor viruses (although formerly believed to be due to 'Slow viruses'). According to Stanley Prusiner of the University of California at San Fransisco, these diseases were caused by an infectious agent, containing protein molecules and no genes. The infectiveness of the brain extracts could be destroyed by heat and other treatments specific for inactivating proteins, but not by those for nucleic acids. Prusiner christened this agent 'Prion' for proteinaceous infective particle. Although there was considerable disbelief and scepticism among scientists to Prusiner's Prion, when first proposed in 1982, evidence linking it to scrapie-like diseases has grown over the years. Partly purified, it seems to be a 33- 35 KDa hydrophobic protein often called PrP for Prion Protein. The P&P gene is present in many normal vertebrates and invertebrates, as presumably an altered PrP is at least partly responsible for the disease. There are those who believe that the disease is transmitted by PrP alone, that infective pathogen is an abnormal or rogue PrP, one that has been chemically modified or has changed configuration in some way. But how can genetic information be transmitted between hosts by a protein ? Possibly too, a tiny scrapie specific 'Virino' or nucleic acid is

coated with PrP. The nucleic acid may not be transmitted, but may be still able to interact with host cells in some way to cause disease.

But how did the BSE attain epidemic proportions, since Scrapie is endemic to British sheep and has been known for more than 200 years? British epidemiologists traced the source of infection to the 'grotesquely unhealthy methods to feed cattle' as one media report puts it, which is the concentrated cattle feed made from rendered carcasses of other ruminant animals (sheep and goat). How could this have been so? The intensive farming methods are partly to blame. Several things happened around the same time because of this. Apparently, the best quality feeds for livestock for intensive farming are made from soya protein and fish meal, the meat and bone meal protein from carcasses coming second best but at a lower cost. In the 70s and 80s, the sheep population in Britain increased, thus raising the level of Scrapie infection too. At the same time, the farmers began to wean their dairy calves earlier than before, thus necessitating the use of weaning feeds rich in proteins. Naturally, a more cost effective weaning food was the proteins that could be rendered from sheep and goat offals, organs including brain and spinal cord and other unusable slaughter-house by-products. The brain and spinal cord carry the infective agent Prion.

It was also found that whereas in the beginning a batch process, utilising high temperatures used to be in practice for rendering a continuous process at moderate temperatures was later on adopted very possibly to save energy and costs during the energy and oil crunch in the mid 1970s.

It is relevant here that

extensive testing has revealed that milk including milk from cows infected with BSE does not contain the infective agent Prion.

BSE has characteristics in common with a group of fatal CNS diseases like Scrapie in sheep and goats, chronic wasting disease in mule deer, transmissible mink encephalopathy and human diseases like Kuru and Creutzfeld-Jakobs Disease (CJD).

Thus, milk and milk products such as yoghurt, ice cream or cheese can be consumed safely. BSE is found only in the muscle tissue of cattle eaten as beef.

The prion protagonists

The investigations by the Central Veterinary Laboratory, UK, showed that parts of the brain of BSE cows were full of holes or vacuoles giving it a spongy appearance.

discovered that its infectiveness could be destroyed by sufficient heat treatments, but without this final treatment in the altered

process, the survival of Scrapie agent seems to have been ensured. The circle was completed and the Scrapie prion was repeatedly recycled through cows. Eventhough only calves and milk cattle were fed with these protein supplements, the sheep protein supplement-fed cows were also in turn converted at some stage into rendered protein supplements which were then fed to sheep and cows. There is a parallel in how the Kuru disease occurs in the tribes in Papua New Guinea. In a cannibalistic ritual practised as peace offering to the dead, the tribes eat the brains of the dead propagating the infective agent - the amyloid protein prior through the man-eat brain cycle.

In BSE, it seems to have been a case of cow-eat-sheep-eat-cow-eat-cow. This would have taken years for the Scrapie agent to build up insufficient levels to cross the species barrier and appear in epidemic proportions in the mid 80s. The sale of cattle feed containing ruminant protein was banned in July 1988. But, scientists believe that cows continued to be fed with contaminated feed long after this ban. Thousands of BSE infected cattle were destroyed. Fear of contaminated meat caused beef sales to plummet and by June 1990 exports to EU and 23 non-EU countries plunged or were banned. The cattle exports alone were worth about 58 million pounds a year. If only the ruminant protein supplement was not used in intensive farming and if only the 1973 oil crisis had not had happened, the mad cow disease may not have occurred so explosively and in such epidemic proportions.

In 1989, the possibility of BSE causing disease in humans seemed remote. There was no evidence to link Scrapie and Creutzfeld- Jakob's Disease. CJD affects one in a million people a year and the average of the victim is 63 years and it would

have taken several years for the symptoms to develop. Both the government and some others seem to have been complacent about this by not culling out possibly infected herds and resorting to slaughter for total eradication, thus temporarily allaying the fears of the public. But, the reported death recently of 10 young people between the age of 18-41 (average age 27 years) has brought into sharp focus again the doubts and debates, regarding the transmission of BSE to humans via the contaminated food chain. The symptoms of these young victims were slight depression and anxiety as opposed to the forgetfulness and odd behaviour of the usual older age victims.

Rob Will of the CJD Surveillance Unit in Edinburgh found convincing evidence in the young victims' brains to link BSE to CJD. In all spongiform diseases, protein fibrils accumulate in brain. In the recent CJD victims' brains, there were many more of them forming very large distinctive masses of protein. The scientists believe that these new strains of CJD could well be the first cases of BSE in humans. The

Neuropathogenesis Unit in Edinburgh has used five breeds of mice to study the spongiform development and is now engaged in fingerprinting the pattern of holes in the brain, formed by different strains of Scrapie, BSE and CJD. Bram

Extensive testing has revealed that milk including milk from cows infected with BSE does not contain the infective agent Prion.

Shreuder and colleagues at the Dutch Institute of Animal Science and Health in Lelystad report that they have developed a Scrapie test which detects prions in tonsils of sheep. The test is based on staining the rogue PrP after purging the sample.

The question now is does Britain face a large epidemic of human BSE? How many

people have been exposed to the prion already? What could be the probable dose that will cause BSE? No one can tell yet. The prospects for a future CJD test may be bright because PrP has been found in related lymph tissues in humans and could well accumulate in tonsils. This could lead to an early diagnosis, if and when any treatment for CJD is found.

Until then, there seems to be reluctance on the part of the people to buy beef, a very British staple; Mac Donalds are selling their famous burgers using Non-British beef. Do we know anything about the occurrence of any similar disease in the cattle and sheep populations in India? Should we just watch Britain suffering from the impossible burden of having to deal with BSE and all its fall out. Is there a lesson for us in this? Should we not wonder what different types of pathogens are being transmitted to our people through the use of variously contaminated meat, fish and poultry and other feeds in the new surge of intensive farming? And take adequate precautions beginning now?

DO YOU KNOW ?

The Oldest and Largest Brewery

The oldest brewery in the world is the Weihenstephan Brewery, Freising, near Munich, Germany, founded in AD 1040.

The largest single brewing organisation in the world is Anheuser-Busch Inc. of St. Louis, Missouri, USA, with 12 breweries in the United States. In 1990, the company sold 10.2 billion litres (2.2 billion gallons), the greatest annual volume ever produced by a brewing company. The company's St. Louis plant covers 40.5 hectares (100 acres) and has an annual capacity of 1.5 billion litres, (336 million gallons).

The largest brewery on a single site is Coors Brewing Co. of Golden, Colorado, USA, where 2.27 billion litres, (499 million gallons) were produced in 1990.

The largest brewing company in the United Kingdom, with over 22 per cent of the UK beer market is Bass Plc. which has 6,785 public houses and 645 off licences. The company has net assets of £ 3.6 billion, controls 13 breweries and has 100,000 employees.

Fat Spread - A Changing Face

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Abstract

There has been fast development in fat spread during the last thirty years. This is mainly attributed to poor spreadability, high price, high saturated fat and cholesterol content of butter and also consumer preference for low fat diet. Butter and margarine are considered to be the traditional spreads. Between these products, number of spreads came into existence, which are classified according to fat content and fat source (e.g., vegetable or milk fat). Recently, PFA (1993) put forward a standard for such products, allowing the manufacturers to use colour and functional additives. FDA (1991) and EC (1993) already gave the regulations which have slightly different approaches. The properties are also

an interesting area to study which include organoleptic properties and spreadability.

Introduction

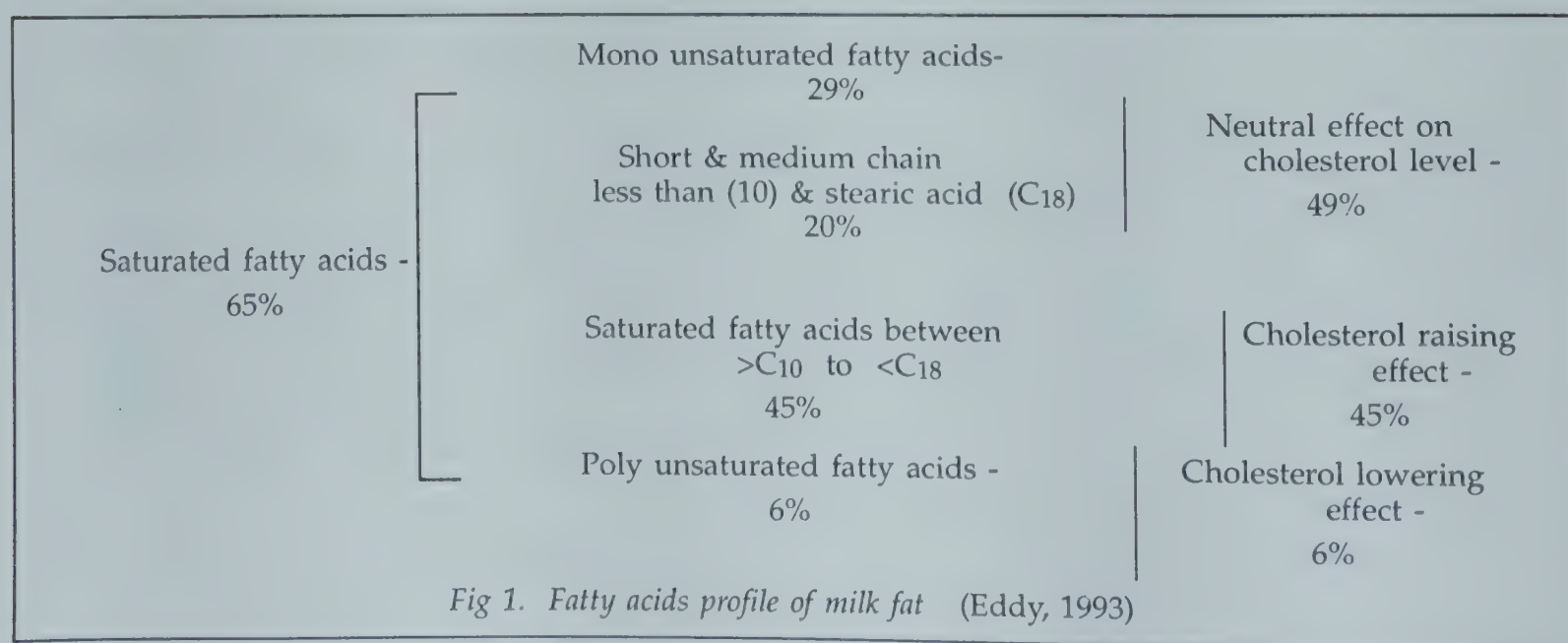
Work on butter has witnessed dramatic change, which probably no other segment of dairy sector has undergone in recent years (Moran, 1993). This is mainly due to the fast development of its substitutes. These imitation butters of mixture of milk fat and vegetable fat are generally designated as "Spreads" (IDF, 1989) or melange products (Gander, 1985) or fat spreads, which do not include traditional yellow fat or yellow fat spread. Yellow fat or yellow fat spreads include butter and margarine, which are mainly intended for

spreading purpose (Forman, 1990).

History and Development

Butter is one of the historical yellow fat spreads, which has been serving mankind since many years. However, there is vast expansion in the fat spread, which is mainly attributed to the following reasons :

Price of butter relative to other fats : The prices of major competing oils do not change significantly during recent years as compared to butter (Brown, 1990) and also competing spread contains high moisture, which offers economic advantage (Frede, 1990).



Development of competing products : Butter has got poor spreadability at refrigeration temperature i.e. 5°C (deMan *et al.*, 1979) and therefore, the modern consumer does not like it. On the other hand, sophistication in manufacturing technique made it possible to manufacture tailor-made products (Brown, 1990) with important characteristics like spreadability, keeping quality, flavour and mouth feel (Frede, 1990).

Health and nutrition considerations : According to Food Drugs Administration, health foods should contain low levels of saturated fat and cholesterol which are linked to coronary heart disease (Haumann, 1993).

Changed dietary habits of consumers : In terms of nutrition, it is often labelled as saturated and hypercholesterolemic and its consumption is clearly associated with coronary heart disease in the minds of consumers (Greyet and Huyghebaert, 1993). The broad fatty acids profile is given in Fig. 1, while comparison of

cholesterol content of different fat is given in Fig. 2.

A number of spreads came into existence, which could take care of the drawbacks of butter.

PFA defined fat spread as a product in the form of water in oil emulsion of an aqueous phase and a fat phase of edible oils and fats excluding animal fats.

The very first type of such product was made by French chemist Hippolyte Mege Mouries in 1869. He used the fresh tallow fat, after crystallization at 25-30°C and by pressing the grainy mass, he obtained 60% of a

semi-fluid fraction, which was having a gloss of pearls called margarine (derived from Greek word "Margaritos" meaning pearls). This semi-fluid material was also called "Oleo margarine". This material was then dispersed in skim milk along with cow udder tissue. The emulsion was agitated for several hours and cold water added to churn, causing the fat to solidify. The water was drained and the granular mass that remained was kneaded and salted (Vanstyvenberg, 1969; Hofmann, 1989).

It is only thirty years ago that there emerged an increasing number of products, which fall between the two traditional strictly distinguished products i.e., margarine, which must not contain milk fat and butter which must be exclusively produced from cream (Frede, 1990; Nichols, 1993). In between these two products, the first blended product of vegetable oil and milk fat was launched in 1969 in Sweden called "Bregott". This

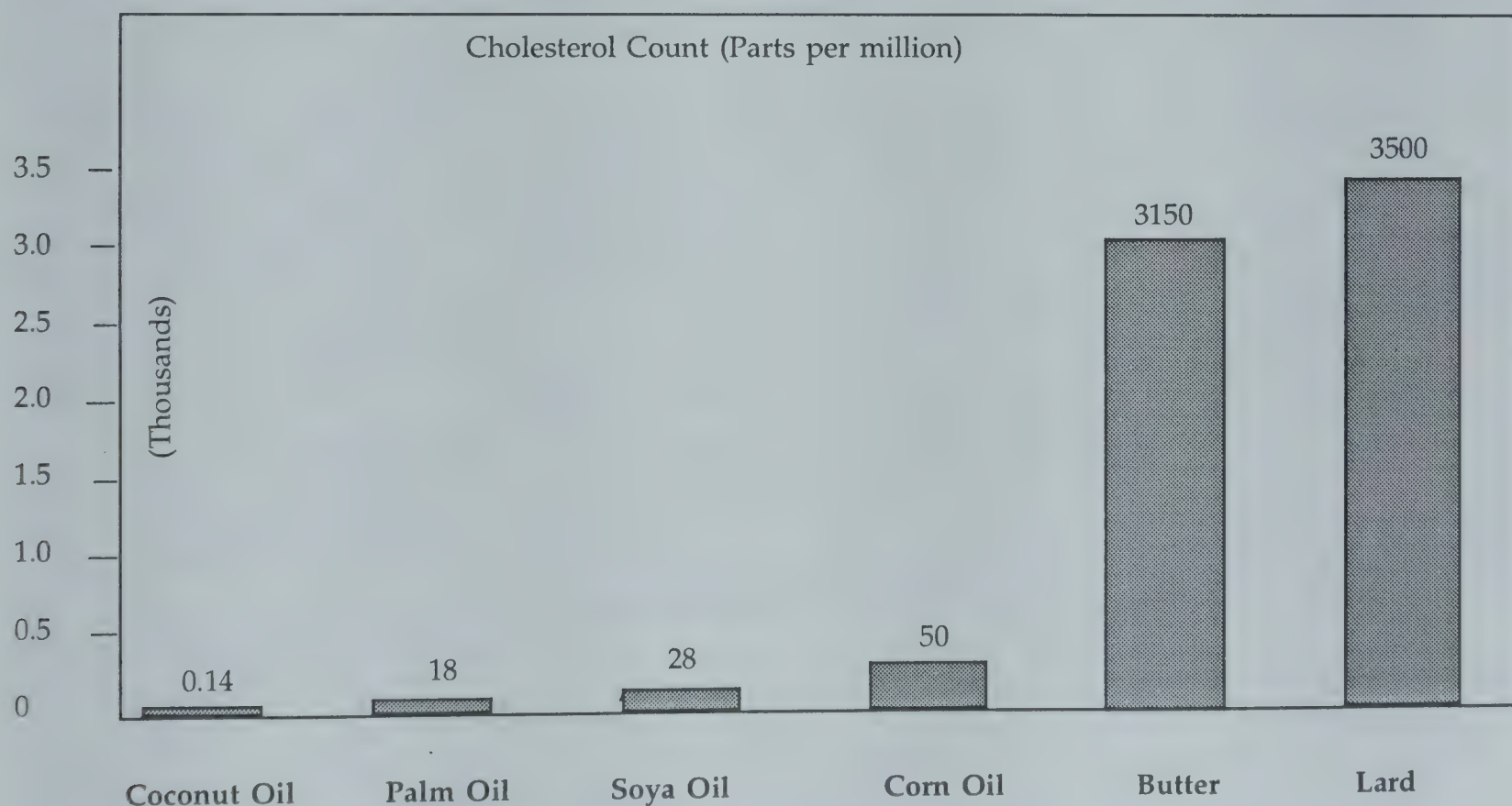


Fig 2. Cholesterol content of different fats (Mary, 1994)

was mainly aimed towards maximizing the flavour attributes of milk fat, while utilising the lubricity of the liquid oil (Greyet and Huyghebaert, 1993). This led to the development of many new spreads in many parts of the world (IDF, 1989).

Definition

PFA (Amendments rules, 1993) defined fat spread as a product in the form of water in oil emulsion of an aqueous phase and a fat phase of edible oils and fats excluding animal fats.

While Nichols (1993) defined the terms "yellow fat and yellow fat product" to denote all fat-based spreads with a fat content of 82% or less, IDF defined a yellow fat spread as a food in the form of spreadable emulsion, intended for spreading, which is mainly of the type water-in-oil, comprising principal-

ly an aqueous phase and edible fats and oils (Forman, 1990).

Classification

PFA (Amendment, 1993) classified the fat spread into the following three groups :-

a. Milk fat spread fat - Fat content will be exclusively from milk.

b. Mixed fat spread - Fat content will be a mixture of milk fat with any one or more of hydrogenated, unhydrogenated refined edible vegetable oils or interesterified fat.

c. Vegetable fat spread or sandwich spread / fat spread - Fat content will be a mixture of any two or more of hydrogenated, unhydrogenated refined vegetable oils or interesterified fat.

The European Community Commission also classified fat spread into three categories

based on the fat source (Table 1). (Brown, 1993a, Greyet and Huyghebaert, 1993 and Nichols, 1993). IDF documents also classified in a slightly different manner as presented in Table 2 (Forman, 1990). Mann (1993) gave the classification of the milk fat products on milk fat basis, in which milk fat provides 100% of the total fat, mixed fat products with a minimum milk fat content of 15% and maximum 80% of the total fat and margarine products with maximum milk fat content of 3% of total fat.

Regulation

According to PFA (amendment, 1993) rules, fat spread may contain edible common salt not exceeding 2% by weight in aqueous phase, milk solids not - fat; starch not less than 100 ppm and not more than 150 ppm; diacetyl may be added as flavour-

Table 1. Proposal for yellow fats designation in European community.

% Fat	Nature of component fat		
	Milk Fat	Fats	Blends
	Exclusively milk fat	Any animal or vegetable fat; milk fat not more than 3% of total fat	Any animal or vegetable fat; milk fat between 10% and 80% of total fat
80 - 90	Butter	Margarine	Blend
60 - 62	3/4 fat butter [Reduced fat butter]	3/4 fat margarine [Reduced fat margarine]	3/4 fat blend [Reduced fat blend]
39 - 41	Half fat butter	Half fat margarine	Half fat blend
>62 - < 80	Dairy Spread	Fat Spread	Blended Spread
>41 - <60	Reduced fat dairy spread	Reduced fat spread	Reduced fat blended spread
>20 - <39	Low fat dairy spread (x % fat)	Low fat spread (x % fat)	Low fat blended spread (x % fat)

(Brown, 1993a; Greyet and Huyghebaert, 1993 and Nicholas, 1993)

Table 2. Classification given by IDF

	Dairy spread	Blended spread	Non-dairy spread
	Containing exclusively fat of milk origin	Blends of fats with min. of 10% of milk fat	Blends of fats containing mostly 10% of non-dairy fats
Minimum of 80% of fat	Butter and whey butter	Blended Spreads	Margarine
Maximum of 79% of fat	Dairy Spread		Non-dairy Spread

(Forman, 1990)

ing agents not exceeding 40 ppm, permitted emulsifiers and stabilisers, permitted antioxidant (BHA or TBHQ) not exceeding 0.02% of the fat content of the spread; permitted class II preservatives, namely sorbic acid including its sodium, potassium and calcium salts (calculated as sorbic acid) or benzoic acid and its sodium and potassium salts (calculated as benzoic acid). Singly or in combination not exceeding 1000 ppm by weight and sequestering agents. It may contain annatto and / or carotene as colouring agents. It shall be free from animal body fat, mineral oil and wax. Vegetable fat spread shall contain raw or refined sesame oil (Thil oil) in sufficient quantity so that when separated fat is mixed with refined groundnut oil in the proportion of 20.08, the red colour produced by Baudouin test shall not be lighter than 2.5 red units in 1 cm cell on a Lovibond scale.

It shall also conform to the following standards namely :

1. Fat - Not more than 80% and not less than 40% by weight.
2. Moisture - Not more than 56% and not less than 16% by weight.
3. Melting point of extracted fat (capillary slip method) in case of vegetable fat spread - Not more than 7°C.
4. Unsaponifiable matter of

extracted fat

a. In case of milk fat and mixed fat spread - Not more than 1% by weight.

b. In case of vegetable fat spread - Not more than 1.5%

c. Acid value of extracted fat - Not more than 0.5%.

The vegetable fat spread shall contain not less than 25 IU synthetic vitamin A per gram at the time of packaging and shall show a positive test for vitamin A, when tested by antimony

The vegetable fat spread shall contain not less than 25 IU synthetic vitamin A per gram at the time of packaging and shall show a positive test for vitamin A, when tested by antimony trichloride.

trichloride (Carr Price reagents as per IS 5886-1970).

FDA (1991) published the regulation for giving the emphasis on fat. On proposed nutrition level, fat would be men-

tioned in five different ways energy from fat, total fat and saturated fat. The requirement for "core descriptors" such as reduced, low and light to indicate that fat has been removed from the products (Bocher, 1992).

EC made a draft of regulation, wherein butterfat fraction can only be used, if the final product is described as "Recombined butter". Stabilizers, emulsifiers and preservatives may be used in products such as half fat butters. In yellow fats, fat and water must together constitute at least 90% by weight of the product. This means that level of proteins, sugars, polysaccharides and other materials would be restricted to a total maximum of 10% by weight. The draft regulation also proposes that product labelling should include the words "Slightly Salted" in the case of the salt content of 0.1 to 2.0% and "Salted" with a salt content of 2.0% or more (Nichols, 1993).

Legislation

The legislation differs from country to country. In Germany, the introduction of imitation butter (low or full fat mixture of animal and vegetable fats) has not been allowed so far (Drews, 1987). In Denmark, the production of blended milk fat plus oil spreads for Danish market has been prohibited since 1991 (Anon, 1990).

Table 3. Production of margarine in India

Year	Margarine (MT)
1981-82	1,708
1982-83	1,072
1983-84	1,232
1984-85	1,047
1985-86	653
1986-87	548
1987-88	563
1988-89	661
1989-90	Not available
1990-91	Not available
1991-92	Not available
1992-93	Not available

(Joshi, 1993)

Sweden has the oldest tradition in the field of spreads. The spreads have been marketed since late 1960s (IDF, 1989). In Finland, the legislation has been changed since 1987. Now, vegeta-

ble oil mixes with 80%, 60% and 40% (60-85% of which as milk fat) are available (Luttinen, 1987). In "France", imitation butter products (mixed fats, low fat spread etc.) have been permitted

since 1980 and have steadily grown in popularity (Wegerich, 1987).

In India, such products have not gained popularity, because of ban on using colouring and flavouring agents in margarines (Joshi, 1993). In 1989, Oil Technologists Association of India suggested some changes in PFA regulation (Bhattacharayya, 1989). In the year 1993, PFA lifted its ban and also put forward regulation for the fat spread.

Market Position

During 1991, the consumption of milk fat continued to fall in many countries and consumption of margarine was increasing in place of butter and general trend was towards healthier eating habits (Frank and Wheelock, 1988; Burney, 1989; Hexeberg, 1989; Brown, 1990; Pickering, 1991; Brown, 1993b). World consumption of butter

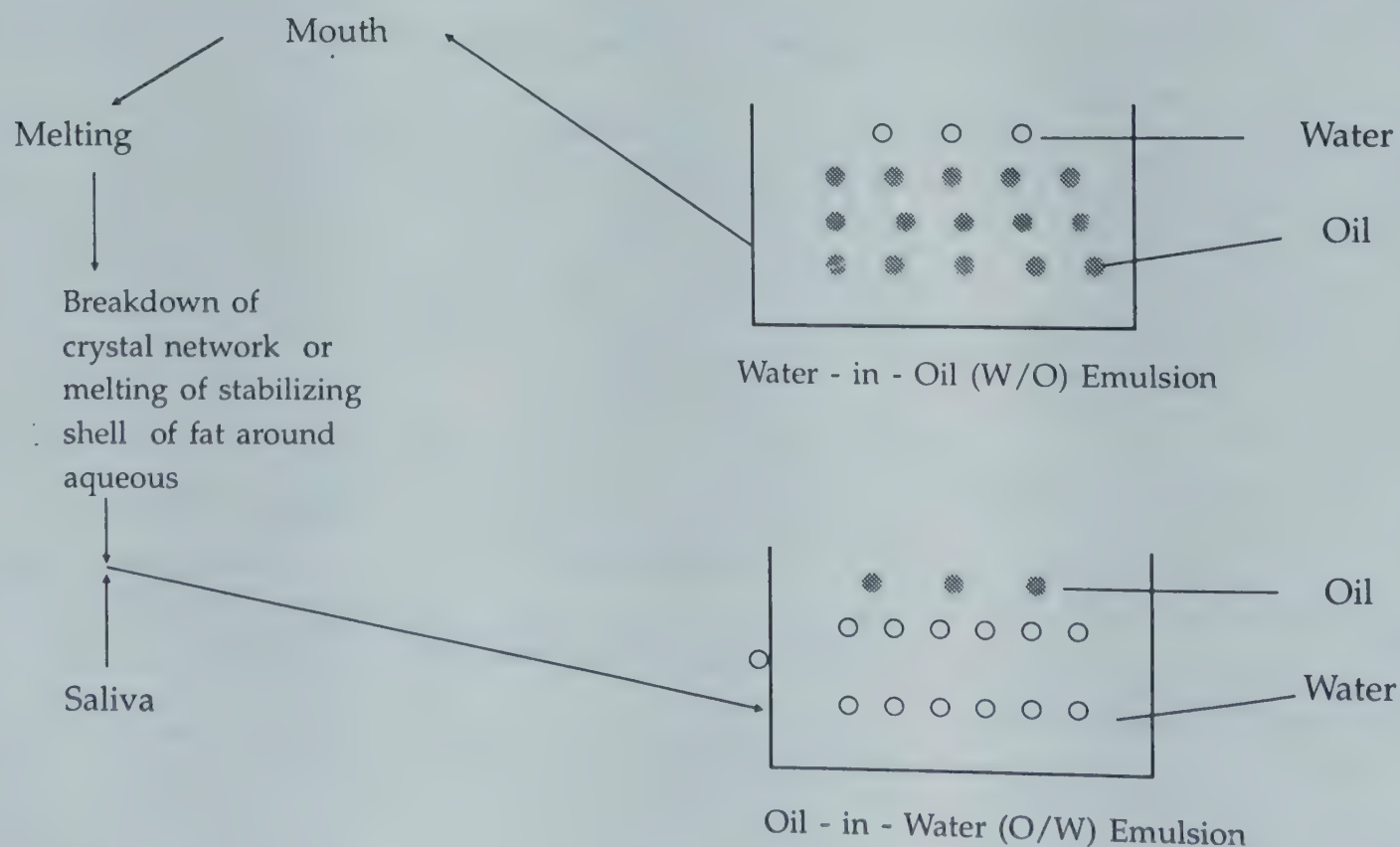


Fig 3. Emulsion inversion on palate

(Moran - 1993)

Table 4. Methods of testing emulsion

Methods	Oil-in-water emulsion	Water-in-oil emulsion
Visual observation	White and creamy	Darker, greasy & oil texture
Addition of a drop of emulsion into water	Complete mixing into water	Remain unchanged, floating on the surface of water
Application of oil-soluble dyes	No effect	Stains
Application of water soluble dyes	Stains	No effect
Drop of emulsion on filter paper (treated with cobalt chloride)	Spread on the paper	It will not spread on filter paper
Measurement of electrical resistance or conductivity	Lower resistance and higher conductivity	Higher resistance & lower conductivity

(Petrowski, 1976)

decreased by nearly 3% in 1990 (Brown, 1990). Product was also cut back largely as a result of manufacturers switching to other products such as cheese and whole milk powder (Brown, 1993b). In Belgium, butter factories decreased by 12.4% during 1990 - 1977 (Cosemans, 1992).

One of the most important properties for spreads from consumer view point is spreadability.

Properties of Spreads

Properties of spreads can broadly be classified into two groups :

1. *Organoleptic properties* :
The taste of the products with

fat spreads is controlled through emulsion inversion. The melting of the product in the mouth simultaneously causes the disruption of the crystal network and the breakdown of the emulsion. The emulsion stabilizing shells of fat around the aqueous melt, with saliva, create an oil-in-water "Cream" from the original water-in-oil "Spread" (Fig. 3). As a result, the viscosity of the emulsion on the palate falls rapidly to a point where swallowing takes place, and rapid diffusion of aromatic compound into nasal cavity occurs (Moran, 1993). Factors affecting the organoleptic qualities are :

- (i) Melting profile of the fat.
- (ii) Lightness of the emulsion.
- (iii) Storage condition of the finished product.

The other important oral quality aspect called "coolness" is the coldness felt on the tongue, when fat crystals melt at nearly the same temperature, absorbing

heat during dispersion in the mouth. The size also affects oral properties of the aqueous phase and is uniformly small. A margarine in which about 95% of the droplet has a diameter of 1-5 μ and 4% of 5-10 μ and 1% of 10 - 20 μ is described as light on the palate (Andersen and Wil-

During 1991, the consumption of milk fat continued to fall in many countries and consumption of margarine was increasing in place of butter.

liams, 1965 ; Hoffmann, 1989).

Spreadability : One of the most important properties for spreads from consumer view

point is spreadability. It is desirable that product should be spreadable at refrigeration temperature i.e. 5°C. To attain a state of plasticity in a product, there must be three essential requirements :

(i) There must be two phases, solid and liquid.

(ii) The solid phase must be so finely dispersed that the crystal mass is held together by lateral cohesive forces.

(iii) There must be proper proportions between the solid and liquid phase. If the spread is deficient in solids, not enough crystal will be present to hold the liquid oil. This is noted when product oozes out oil. If the solid content is too high, the interlocking crystals, coupled with insufficient liquid, will cause shortening of the product and break subsequently to be brittle (Crabtree, 1989).

Testing of Emulsions

All the spreads can be broadly classified into two groups (i) oil-in-water emulsion type (ii) water-in-oil emulsion type. To differentiate these two groups, the emulsion will exhibit the properties more of the external phase than of the internal phase. Different ways of determining the type of emulsion are given Table 4.

Conclusion

There is little comfort for the dairy industry in recent years. Overall, the yellow fat sector continues to decline slowly as eating habits change. Within the sector, both butter and traditional full fat margarines follow a declining phase with the growth having been now shifted towards the low fat sector. The main reason is that these substitutes are products with harmonizing safety along with good nutrition. At the same time, by their good taste, flavour and low cost as well as by necessary spreadability, they can meet

the customer's requirements.

India has not witnessed these trends so far. Butter production continues to increase with

It is high time for the Indian dairy industry to plunge into fat spreads, and encourage the use of dairy products as ingredients in composite products.

little development in substitutes production. Nevertheless, the demand for such products is likely to be generated in the near future and the future looks bright for these products. If dairy industries do not start making these products, oil industries will. Their purpose is to maximise the profit level and not to promote dairy products. It is high time for the Indian dairy industry to plunge into fat spreads, and encourage the use of dairy products as ingredients in composite products.

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Status and Prospects of Soybean Industry in India

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Abstract

Soybean production in India in 1995-96 is likely to be over 4 million tonnes. Presently, there are 154 soybean solvent oil extraction plants, 60 soyfood manufacturing units, 30 companies dealing with equipment and 15 organizations and agencies involved in soybean trade. India being a non-traditional soybean producing country, there have been some difficulties in promoting the use of soy products. However, as of now, soy products like oil and protein foods have entered the market and people have accepted it because of health and economic benefits. The demand for soyproducts is increasing. They promise nutritional security, better health and economic viability.

Introduction

Soybean is a legume crop originally grown in India on the foothills of the Himalayas and some other parts. However, exploitation of its commercial potential and the introduction of yellow soybean started with adaptive research in the mid sixties. From less than 10,000 tonnes in 1969-70, production of soybean during 1993-94 has reached to 3.90 million tonnes (MT) and it is expected that during 1995-96, it would be over 4 MT (Bhatnagar, 1994; SOPA, 1995a).

Soybean, having both - protein and oil, is an important source of low-cost food and therefore, is of great significance to India. It has gained importance for its contribution to the foreign exchange to the extent of US \$ 500 million/year and for augmenting edible oil resources of India by about 0.6 million tonnes per year. It has brought socio-economic prosperity to soybean farmers.

The primary interest in soybean in India has been oil, although increasing attention is currently being paid to the potential that soybean offers as a major protein source.

During the financial year 1993-94, total quantity of soybean processed was 3.12 MT, which resulted in 2.57 MT of soymeal and 0.55 million tonnes of oil. It gave an overall oil recovery of 17.65% and that of soymeal 82.35% (SOPA, 1994). Today, soybean occupies a vital

place in agriculture and oil economy of India. It has emerged as third important oilseed crop after groundnut and rape/mustard, contributing 16% to the total oilseeds production of 22 million tonnes.

Processing of Soybean

The primary interest in soybean in India has been oil, although increasing attention is currently being paid to the potential that soybean offers as a major protein source. Soybean is processed for its oil, protein and lecithin. Whole beans or partially/fully defatted cake/meal are used in making various traditional and non-traditional products (Table 1).

Whole bean is used for making non-fermented traditional food products like full fat flour, dairy analogs (milk, paneer and icecream) and snack foods (roasted/sprouted bean). Fermented products are nutritious and easily digestible. It also increases protein level by about 50% and also protein quality. Use of flavour and grits is increasing in the food industry.

Soybean Industry

The present day soybean industry has about 265 units which may be grouped as under

* Project Director

Status and Prospects of Soybean Industry in India

Table 1. Traditional and non-traditional soyproducts in India (Ali, 1993a)

Traditional products	Non-traditional products
● Cooking oil	● Texturized soy-protein
● Hydrogenated fat	● Health foods
● Flours, flakes and grits	● Lecithin
● Roasted/fried nuts	● Protein concentrate
● Sprouted beans	● Protein isolate
● Cooked beans	● Protein hydrolysate
● Milk	● Liquid protein
● Paneer (Tofu)	● Yoghurt
● Bakery products	● Tempeh
● Splits (<i>dhal</i>)	● Sauce
● Vadi	

Oil extraction	154
Food manufacturing units	60
Equipment manufacturers	30
Trading houses	15
Government or other agencies	6

Total

265

Food Industry

The major food uses of soybean are from its oil, protein and lecithin. Till 1979, there were only 5 solvent oil extraction units, which were not adequate. The total capacity was 1,32,000 tonnes in 1979, while production of soybean was

2,40,000 tonnes. By 1981, eight more plants were added and these increased the capacity to 3,12,000 tonnes. It was only after 1981 that a mushroom growth of solvent extraction units took place under various incentive schemes for setting-up of industries in backward areas. By 1984, as many as 40 plants with a capacity of 1.31 million tonnes were operating. By 1989, as much as 3.5 MT capacity of 50-odd plants were installed, compared to 1.5 million tonnes of soybean supply in a good year. In 1995, there were 154

soybean oil processing units in India with the total installed capacity of 13.5 million tonnes of soybean per annum (Table 2). Utilization of the installed capacity is hardly 35-40%, as the annual production of soybean is ranging between 3-4 million tonnes.

There are about 60 soyfood manufacturing units in India. Type, number and their installed capacity are given in Table 3. Only one unit is making fermented foods. Non-fermented food items like flour, texturized soyprotein, soyfortified bakery products, milk, *paneer*, snacks, protein concentrates and isolates and health foods are manufactured by majority of them. Five units are making edible grade soy-lecithin.

Livestock Feed

Soybean has been used as feed by the farmers, who have reported that soyfeed is liked by the animals and also resulted in the increase of milk yield (Bapna *et al*, 1992). Similarly, soya fodder mixed with traditional fodder is liked by cattle and it improves their health, resulting

Table 2. Statewise soybean oil extraction plants in India and their installed capacity (SOPA, 1995b)

Name of State	Number of plants	Installed capacity, tonnes per day	Total annual capacity based on 300 working days, tonnes	Percentage of capacity
Madhya Pradesh	72	26845	8053500	59.75
Maharashtra	37	7140	2142000	15.90
Gujarat	17	3470	1041000	7.72
Andhra Pradesh	8	2530	759000	5.62
Rajasthan	6	1750	525000	3.90
Uttar Pradesh	7	1390	417000	3.09
Punjab	1	700	210000	1.55
Karnataka	4	510	153000	1.13
Tamil Nadu	1	300	90000	0.67
Haryana	1	300	90000	0.67
Total	154	44935	13480500	100.00

Table 3. Type, number and installed capacity of Indian soyfood manufacturing units

Type of soyfood unit	Number of the units	Installed capacity, tonnes/year
Texturized soyprotein (soynuggets)	20	1,20,000
Soymilk	10	500
Soypaneer (Tofu)	6	1,000
Soyflour, flakes and grits	5	20,000
Soy fortified baked products	5	1,000
Soylecithin	5	2,000
Soyprotein isolates and concentrates	3	500
Health foods	3	5,000
Snack foods	2	200
Soy-yoghurt	1	60
Liquid protein	1	5
Total	60	1,50,265

in better yield and output performance. However, because of the export, use of soybean/soymeal as cattle feed in India is not very significant. One of the reasons is its high price, compared to other commonly used feeds like by-products of pulse and rice industries, groundnut meal and other oil-cakes. Another problem is that soybean, unlike other Concentrated feeds, cannot be fed to animals directly because it is hard to digest. Farmers need to be educated as to how to mix soybean and/or soybean cake/meal with other substitutes, while preparing concentrates. It, therefore, shows a great potential to use soymeal as livestock feed within the country.

Industrial Applications

Though soybean products have potential for several industrial applications like in tanning, wall-board, mortar cement, asphalt, pesticides, herbicides, wall paper coating,

glues, paint, fire fighting foam, shoe polish, lamination, printing ink, surfactants, plasticizer, etc., at present, except industrial application of lecithin and use of plant stem as a fuel source in rural areas, not much has been exploited in India. Therefore, there is a need to exploit industrial uses of soybean.

R and D Efforts and Entrepreneurship Development

There are many small scale entrepreneurs interested in soy-based food industry. However, they wish to see the working of a complete plant to know the actual investment and facts about capacity of the plant and quality of the product to judge the market potential and also to be sure of availability of training facilities for their production staff, before taking final decision to go for establishment of soyfood production plant. Project profiles/reports alongwith economic analysis based on

actual commercial scale pilot plants are not available in the country. There is no local company, which can execute the establishment of soyfood processing plant on turn-key basis. Creation of domestic market for soymeal through its utilization in food and feed is essential for delinking foreign dependence of soybean industry. There is also paucity of trained and specialized scientific manpower and R and D activities in the area of soybean processing and utilization.

In order to address the above issues, the Government of India, under the aegis of the Indian Council of Agricultural Research (ICAR), New Delhi with the financial assistance of the United States Agency for International Development (USAID), Washington has established Soybean Processing and Utilization Centre (SPUC) at the Central Institute of Agricultural Engineering, in Bhopal during April, 1985. The Centre has developed a number of soyfood products, catering to the requirements of Indian consumers and equipment and pilot scale production facilities (Ali, 1991, 1993 and 1994).

The ongoing programmes of the Centre are on the development of package for the production of edible grade soybean meal and its domestic utilization ; extrusion-exPELLing pilot ; improvement in the quality of soybean milk using enzymes ; soy-based extruded and fermented snack foods ; bakery products ; by-products utilization and entrepreneurship development through technology transfer and service support.

The Soybean Processing and Utilization Centre can give technology, prepare project report, provide support service including consultancy for production and market search of soyproducts. Training in the production of soy-based food products and machinery can also

be arranged for individuals, groups and entrepreneurs for domestic use and commercial production of soyproducts.

Product Promotion and Policy Issues

India is a non-traditional soybean producing country. Hence, there have been initial difficulties in processing and promotion of soyproducts. People are generally reluctant to change their food habits. Sometimes, under compulsion - say for health reason, or due to non-availability of their preferred food, or for consideration of prices, they tend to venture out to try new food items. However, at present, soyproducts like oil and protein foods namely, flour, soynuggets, milk, *paneer* (Tofu), yoghurt, soy-fortified bakery products, soysauce, health and speciality foods have made their entry in the market and the people have accepted them on economic and health grounds. The demand of such products is increasing every year.

Investment on soybean research must be strengthened and persistent R and D efforts be made to develop cost-effective technology for domestic use of soyprotein as food and feed. R and D should consider all aspects of soybean, starting from farm level issue to meeting consumer needs. In fact, it is time that a National Plant Protein Board (NPPB) is established so that adequate efforts to augment vegetable protein availability are taken. Such a Board can look into processing capacities, introduction of new technology, promotion of products at consumer levels and to influence policies at various levels to meet the protein needs of our people.

In the case of soybean, either the government may have to offer subsidy to industries to motivate the people to try the

products, or make efforts to promote the product or alternatively push the acceptance of the product through

The Soybean Processing and Utilization Centre can give technology, prepare project report, provide support service including consultancy for production and market search of soyproducts.

government programmes and schemes like mid-day meal and hospital/canteen subsidized food schemes. It may even be made compulsory to make use of soyflour in cereal products. These measures are needed on a

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short-term basis in order to increase the awareness of the consumers. In the long run, soyproducts would have to

survive on the basis of the product strength i.e., it should be low-priced and acceptable to the consumers. Efforts are being made on these lines at SPU Centre, CIAE, Bhopal.

Soybean has a bright future in India. Low-priced and high nutritive soy-based food and feed products are gaining consumer acceptance and the demand for these products is increasing. It, therefore, ensures economic viability of soybean industry and promises household nutritional security and better health in the near future.

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NEW MACHINERY

Digital Thermometer

The Odin India Pvt Ltd., Madras in collaboration with Ametek Inc., USA are manufacturing a DT-8300 digital thermometer. This is a field instrument designed for dependable worry-free temperature measurement, which can be used with any type K thermocouple for quick, convenient and continuous monitoring of liquids and gases. The stainless steel housing and one-piece Valox bezel/face provide a corrosion resistant package for harsh environment. An external power model is available for operation with an unregulated 6-28 V DC power supply.

For details contact :
Odin India Pvt. Ltd.,
17, III Main Road,
Kasturba Nagar
Madras - 600 020

Pouch Making Machine

The Mangalam Industrial Combines, Madras have developed an automatic pouch making machine. Using this machine, pouches from various materials like glassine poly, polyester ploy, multilayer films, laminated aluminium foils and BOPP lacquered paper can be made. Pouches of varied sizes can be made with 4 sides, 3 sides and central sealed types, and the width can be of 50 mm and the length can be between 50-375 mm. The flexibility of the

machine in making varied sizes of pouches, using different materials makes it ideally suited for flexible film converters to make ready-made pouches to suit the desired requirement.

For details contact :

Mangalam Industrial Combines,
No. 7,A(NP), Kubera Ganapathy Street,

Mathiazhagan Nagar
Padi, Madras - 600 050.

Vacuum and Plain Desiccator

The Top Export Pvt Ltd., Mumbai have come out with an unbreakable plastic vacuum and plain desiccator, which is strong, lightweight and easy to handle. It can hold a vacuum of 760 mm of Hg for 24 hours. The top section is made of transparent polycarbonate and the bottom portion is of glass-filled polypropylene with high chemical resistance. The silicon O-ring in the lower section groove gives an excellent seal with the upper section. The desiccator is available in 200 mm (8") diameter and 4 to 1 capacity.

For details contact :

Top Exports Pvt. Ltd.,
Unit No.1, Prabhadevi Industrial Estate,
Mumbai - 400 025

Cream - Filling Machine

The Autopack Machines Pvt. Ltd., Mumbai are manufacturing semi-automatic

cream-filling machines, CF-30, for filling of products of various viscosities in a jars, containers, bottles and pouches of different shapes and sizes with an accuracy of up to 1%. The filling capacity ranges from 5g to 1 kg and output up to 30 fills/min. The machines are fully automatic with in-line coding, sealing, capping etc.

For details contact :

Autopack Machines Pvt. Ltd.,
101-C, Poonam Chambers,
Dr. Annie Besant Road, Worli,
Mumbai - 400 018.

Membrane Filters

Maxflow, Mumbai, offers micro separation with a precision. These filters are thin porous structures composed of pure and biologically inert cellulose esters or similar polymeric materials. They are available in eight distinct pore sizes, in discs ranging from 13 mm to 293 mm diameter. The pores in filters are extraordinarily uniform in size as determined by 'bubble point' method. The total range of pore size distribution in the 0.45 μm filter is $\pm 0.4 \mu\text{m}$, and that in 0.22 μm is $\pm 0.02 \mu\text{m}$. Each square centimeter of Maxflow filter contains millions of capillary pores which occupy approximately 70% to 80% of the total filter volume. The filters are available in pore sizes ranging from 0.22 μm to 5 μm . Flow rates are atleast 40 times faster than through conventional filters.

Maxflow membranes are recommended for all analytical ultracleaning and sterilising applications below 75°C. These disposable filters do not require any prior treatment.

For details contact :

Maxflow
208, Neelam
108, Worli Sea Face Road
Worli
Mumbai - 400 018

Photoelectric Calorimeter

The Sanjay Scientific Corporation, Mumbai is offering Manostat's Test Tube Model 8003 and Cell Model 9003 in photoelectric calorimetry. The test tube model comes complete with illuminated galvanometer and dial, with one sinterfused solution cell, instruction manual and two colour filters (blue and green), one fitter holder, plastic box which holds unmounted filters. The cell model is available complete with illuminated galvanometer and dial, with two test tube solution cell instruction manual and other accessories as in test tube model. The measurements and adjustments are unfailingly reproducible. The precision potentiometer is provided with a logarithmic scale, graduated from 0 to 1,000. Calibration can be plotted for pollution deviating from law.

For details contact :

Sanjay Scientific Corporation
B-6, Singapuri Buildings, Ground Floor
609, JSS Road
Mumbai - 400 002

Incubator for Bacteriological Assays

The Tempo Instruments & Equipments (India) Pvt. Ltd., is manufacturing a bacteriological TI-90 incubator with double walled cabinet of mild steel and lagged with best quality glasswool. The inner door is made of glass panel set, while the outer door is a double walled one of mild steel working on heavy chromium plated hinges with a roller type latch. It has good ventilation arrangement and has maximum resistance to air convection. The temperature control system is better than $\pm 0.5^\circ\text{C}$.

For details contact :

Tempo Instruments & Equipments (India) Pvt. Ltd.
1, Lamington Chambers
394, Dr. Bhadkamkar Marg
Mumbai - 400 004

SPE Cartridges

The Chromatopak Analytical Instrumentation (India) Ltd. is manufacturing the Accu bond precision Solid Phase Extraction (SPE) cartridges. This is a cost effective alternative to liquid- liquid extraction that provides far lower solvent usage for preparation of samples for GC, LC, RIA, MS, NMR, UV/VIS, AA etc. The main features of the cartridges are tested, cartridges assure maximum reproducibility, no reliance on immiscibility of solvents, free from emulsion formation, cleaner extracts resulting in longer column life

for GC and LC, rapid multi-sample processing - higher sample throughput, and more laboratory time for data analysis.

For details contact :

Chromatopak Analytical Instrumentation (India) Pvt. Ltd.
Panchratna Apartments
29B, Jawahar Nagar
Goregaon (W)
Mumbai - 400 062

High Precision Electronic Balance

High precision electronic balances are being manufactured by Contech Instruments Co., Mumbai. These balances confirm to OIML standards and are incorporated with internationally known technology. The accuracy in weighing ranges from 0.001 g to 3000 g, and has the facility to weigh in terms of grams, carats and also for parts counting. The other features are automatic zero tracking, auto calibration with standard weights, variable response time, RS232 interface etc., It can operate under voltage fluctuation range of 110 V to 300 V AC. Accessories like breeze shield and density determination kits are also offered optionally.

For details contact :

Contech Instruments Company
33, III Floor, Bhandup Industrial Estate
Pannalal Compound, LBS Marg
Bhandup (W)
Mumbai - 400 078

RESEARCH ROUND-UP

Buttermilk in Powder Form

Scientists of the Tamil Nadu Veterinary and Animal Sciences University have developed an innovative method /process for converting buttermilk into powder form. Buttermilk is concentrated to a powder form by spray drying and can be stored upto three to six months. It has also been shown that powdered buttermilk can be replaced by skimmed milk powder in the preparation of yoghurt at 25, 50, 75 and 100 % levels. But the yoghurt prepared at 50% level had good sensory qualities.

The dried buttermilk powder can also be reconstituted with water and used as a thirst-quenching drink.

Consumer Industry Laying Increasing Emphasis on Kids

Indian children, of late, have greatly contributed to the sudden growth and expansion of consumer products. This is according to a study report published by the Operations Research Group.

It has been observed that a quarter of India's population is below 14 years and they account for over Rs. 10 billion sales through consumer market.

Indian children eat ice creams worth \$ 70 million

annually, motivate the sales of over 600,000 colour television sets and sustain 70% of the health food industry. Also, an Indian child has witnessed a spurt in spending capacity. But when it comes to fast food, they are choosy about the brand they want.

India and Britain Sign Science and Technology Agreement

In order to have a closer science and technology research links between India and Britain, a science and technology agreement was signed by the two countries recently. This agreement is an important step forward in the science and technology relationship and would signal as a new commitment to work together, where there is mutual advantage.

They have announced creation of a jointly sponsored research collaboration fund worth £ 200,000 (over Rs. 10 million) a year for three years which will make grants to help establish closer links between research teams in the UK and India. The main activities envisaged under the agreement are :

- (i) Scientific meetings, (ii) Exchange of information, (iii) Visits and exchange of scientists and (iv) Co-operative projects and programmes.

Is Papaya a Male Contraceptive ?

At an International Symposium on male contraception held in Delhi recently, a scientist from the University of Gujarat, Ahmedabad presented his research results on the use of an extract of Indian papaya '*Carica papaya*' as a male anti-fertility agent. The test of an extract of papaya in water has proved well on male rats as an anti-fertility drug. This topic had a fuelling heated debate among the participants with varied opinion. However, extensive studies conducted both on crude extract of papaya and its specific fractions have confirmed the anti-fertility property, which has been reported in *International Journal of Pharmacology*.

Another study conducted at the Government Ayurvedic College, Bangalore has revealed that the plant extract has the ability to bind sperms together in the form of a bundle making them difficult to swim.

ICAR Brings out Crops for Export-oriented Farming

According to a report released by the Indian Council of Agricultural Research, New Delhi, several new crop varieties suited for export-oriented farming have been successfully

RESEARCH ROUND-UP

brought out by different centres of the council.

Under the fruits and vegetables categories which have the easiest access to export markets are :

Arka Neelkiran, a new hybrid mango variety brought out by the Indian Institute of Horticultural Research - an ICAR Institute at Bangalore - has given a yield of 12 tonnes per hectare. Being of uniform fruit size and good colour, it is ideal for export farming.

Among the other new fruit varieties released this year are grapes, two bananas and a long shelf-life apple - all good for export marketing.

Systematic research undertaken by different ICAR Institutes has "engineed" a vegetable revolution in the country, with the current year's vegetable output reaching 67 million tonnes, making India the second largest vegetable producing country.

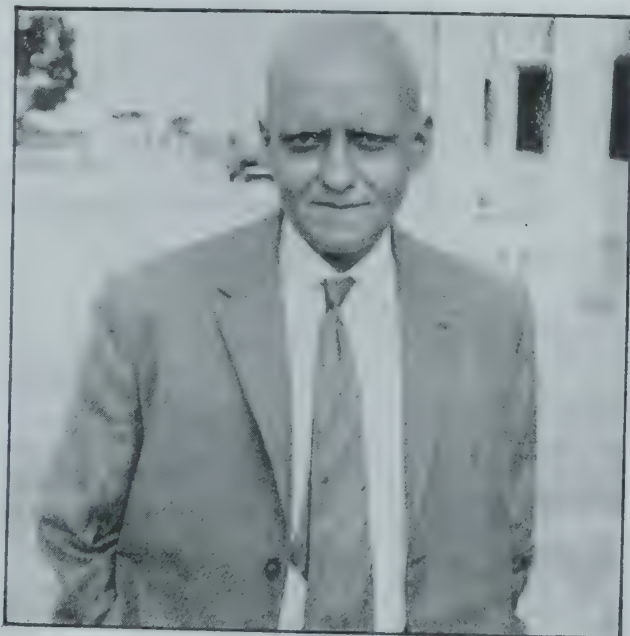
Arka Meghali, a semi-determinate variety of tomato suited for rain-fed areas and giving 45 per cent higher yield over the current best Pusa Rubi, is bound to be another favourite with export farmers.

A high-yielding paprika - Arka Abhir - with a low pungency of 0.05 per cent papsaicin, gives more than 20

tonnes of yield per hectare. It is a good variety for high-export paprika oleoresins industries.

New, high-yielding varieties in okra (bhindi), onion, brinjal and cluster beans from different ICAR Institutes have become popular across the country and helped farmers realise better prices because of export demand.

In cucurbits, 93 lines of musk melon, 41 of water melons, 88 of cucumber, 226 of bitter gourd, 95 of bottle gourd and 200 of pointed gourd have been identified for their potential in production and export.



OBITUARY

We record with deep regret the demise of Dr. C. P. Anantakrishnan, on 8th June 1996 at Coimbatore. He was 80. Dr. Anantakrishnan was a fellow of the Association of Food Scientists & Technologists (India) and Former Head, National Dairy Research Institute, Bangalore from 1941-1976.

Dr. Anantakrishnan was a well known Dairy Technologist, whose scientific career spanned over 36 years, signifying great achievements in his area. He had a brilliant academic career. He won a gold medal for having secured 1st class and 1st rank in B.Sc degree from Madras University. He also bagged Sir William Wedderburn Prize. He had 2 Ph.D degrees, one from Madras University, his Alma Mater and another from Cornell University, USA.

He was a member of many professional bodies which include Technological Institute of Great Britain. He was also a fellow of Royal Institute of Chemistry and Indian Dairy Association.

He has published over 200 research papers in reputed journals both in India and abroad. He has authored about 7 books on Dairy Technology and allied subjects. He was an advisor to Kerala Agricultural University and Visiting Professor of University of Agricultural Sciences, Bangalore. He had made significant contributions in the area of Dairy Chemistry and Technology and served the cause of Dairy Education Research with distinction.

His death is a great loss to scientific community and has created a void which is very difficult to fill.

The Association of Food Scientists & Technologists (I) deeply mourn the death of Dr C. P. Anantakrishnan and convey their condolences to the bereaved family.

DATA BANK

Exports of oilmeals, oilseeds & minor fats

Items	1994-95		1993-94		1992-93		1991-92		1990-91	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
I. Oilcakes / Extractions										
a. Soybean Exts.	1637.2	10277.6	2381.4	15006.6	1825.0	11143.7	1361.3	6564.5	1352.6	4738.8
b. Groundnut Exts.	348.9	1534.2	439.7	1941.5	293.0	1106.6	206.8	646.8	139.6	347.5
c. Cottonseed Exts.	13.2	58.1	10.7	40.9	22.3	85.4	1.9	6.5	17.0	36.0
d. Rice bran Exts	336.1	681.2	497.5	842.1	404.4	840.6	519.9	771.9	455.7	534.9
e. Rape seed Exts.	955.8	2605.8	680.7	1793.4	704.7	1334.3	702.1	968.9	531.1	715.7
f. Sunflower seed Exts.	137.4	337.6	228.6	572.3	242.4	562.7	185.9	314.8	92.3	142.1
g. Sal seed Exts.	41.5	70.4	37.4	56.2	55.2	104.7	34.8	69.3	43.4	47.8
h. Sesame seed Exts.	9.5	59.5	38.1	215.4	34.8	167.8	15.7	64.5	7.7	21.6
i. Other Exts/Feeds	101.2	485.3	25.8	91.1	24.3	70.9	19.4	36.1	17.1	29.8
Sub Total (I)	3580.8	16109.7	4339.9	20559.5	3606.1	15416.7	3047.8	9443.3	2656.5	6614.2
II. Oilseeds										
a. Sesame seed	55.1	1353.9	21.8	413.1	48.5	826.0	33.6	614.6	47.2	720.7
b. Groundnut	51.2	1025.6	96.5	1769.6	5.3	95.6	1.7	36.2	35.4	624.3
c. Safflower seed	0.2	2.1	4.4	44.7	1.1	11.3	-	-	-	-
d. Sunflower seed	0.4	10.2	0.1	1.4	NA	NA	NA	NA	NA	NA
e. Rape / Mustard seed	0.8	9.5	0.4	4.7	NA	NA	NA	NA	NA	NA
Sub Total (II)	107.7	2401.3	123.2	2233.5	54.9	932.9	35.3	650.8	82.6	1345.0
III. Minor Oils/Fats										
	3.5	167.6	2.4	101.5	6.8	261.4	4.5	216.0	3.5	108.0
Sub Total (III)	3.5	167.6	2.4	101.5	6.8	261.4	4.5	216.0	3.5	108.0
Grand Total	3692.0	18678.6	4465.5	22894.5	3667.8	16611.0	3087.6	10310.1	2742.6	8067.2

(Quantity in '000 tonnes, Value in Rs. million)

Source : CENTRAL CO-ORDINATION OFFICE (CCO) OF SOPA, SEA, GEEDA, IOPEA & AICOSCA

India's share in world production of oilseeds 1994-95

(Quantity in million tonnes)

Oilseeds	World	India	Percentage
Soybean	135.3	3.2	2.36
Cottonseed	32.4	4.3	13.13
Groundnut	18.1	5.6	31.10
Sunflower	22.7	1.2	5.37
Rapeseed	29.5	5.4	18.46
Sesame seed	2.4	0.8	32.80
Palm kernels	4.7	-	0.06
Copra	5.0	0.5	9.40
Linseed	2.4	0.3	14.17
Castorseed	1.2	0.8	65.63
Total	253.7	22.1	8.73

Source : Oil World Annual 1995

**DATA
BANK**

Trend in export of spices from India to Japan

(Qty. in M.T., Value in Rs. million)

Spices	1992-93		1993-94		1994-95	
	Qty.	Value	Qty.	Value	Qty.	Value
Pepper	393	13.46	400	17.08	409	27.62
Cardamom (s)	105	47.80	114	42.82	146	40.81
Chillies	151	9.30	99	6.21	26	1.68
Ginger	104	3.04	98	3.18	88	4.59
Turmeric	1979	49.18	1557	33.90	2115	35.88
Coriander	-	-	19	0.29	36	0.58
Cumin	314	22.01	443	32.12	780	38.13
Celery	68	1.26	120	2.34	102	3.64
Fennel	12	0.32	57	1.37	46	1.54
Fenugreek	425	4.45	780	11.40	1046	17.13
Other seed spices	42	1.27	127	3.94	141	4.34
Garlic	346	12.62	166	5.17	88	4.65
Other spices	2606	18.59	2611	16.39	1819	14.19
Curry powder	1	0.11	11	0.79	14	1.11
Mint oil	239	48.02	110	14.85	119	47.80
Spice oils and oleoresins	193	31.17	41	46.92	88	57.53
Total	6978	262.60	6753	238.77	7063	301.22

Item-wise export of spices from India

(Qty in M.T. Value in Rs. Lakhs)

Item	1991-92		1992-93		1993-94		1994-95		1995-96 (E)	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
Pepper	20,535	7431.70	23,821	7893.58	48,743	18909.67	37,264	23664.19	24,150	18111.40
Cardamom (Small)	544	1557.41	190	750.57	387	1454.83	257	762.61	500	1239.55
Cardamom (Large)	910	504.53	1,255	881.66	1,797	1256.96	1,293	812.74	1,690	1189.40
Chillies	32,603	8948.49	17,038	6837.09	30,776	7213.56	20,096	5711.63	55,200	19084.00
Ginger	14,259	2188.10	9,825	1687.37	18,442	2478.12	12,022	1673.03	16,250	3516.45
Turmeric	19,661	3776.22	19,726	4885.43	25,436	5256.00	28,286	4517.96	26,675	4423.80
Coriander	9,954	1323.47	13,737	2102.58	13,552	2103.51	10,702	1793.84	10,700	2075.20
Cumin	1,654	637.47	2,620	1438.87	3,225	1630.36	5,618	2449.65	3,430	1473.90
Celery	3,489	584.58	3,137	467.70	4,130	662.62	2,601	777.28	2,260	521.65
Fennel	2,136	480.88	3,007	705.07	2,637	642.18	2,029	581.56	2,525	712.50
Fenugreek	6,375	557.33	5,255	569.64	4,934	721.41	7,956	1224.97	14,450	1791.25
Other seeds (1)	1,282	251.52	1,405	301.10	1,938	402.85	2,338	486.86	2,050	439.60
Garlic	10,282	828.42	7,441	710.15	2,845	354.89	633	122.87	3,640	463.00
Other spices (2)	13,512	1831.05	16,649	2328.72	17,318	2648.42	16,523	2954.61	20,660	3467.45
Curry powder	3,516	1100.14	2,848	1023.54	3,411	1231.92	4,135	1443.27	3,885	1538.00
Mint oil (*)	-	-	1,510	2605.99	1,410	3015.72	1,583	4356.78	1,135	3823.30
Spices oils and Oleoresins	1,392	6095.45	1,270	6674.58	1,355	7160.99	1,672	8676.68	1,630	10464.55
Grand Total	142,104	38096.76	130,734	41863.64	182,336	57144.01	155,008	62010.53	190,830	74335.00
Value in million US \$	154.56		144.96		182.57		197.86		223.08	

(E) Estimate

(*) From 1992-93 onwards

(1) Include ajwanseed, Dill seed, Poppy seed, Aniseed etc.

(2) Include tamarind, asafoetida, cinnamon, cassia, tejpat, kokam, saffron etc.

Source : DGCI & S. Calcutta/shipping bills/exporters returns

**DATA
BANK**

**Exports of Processed Foods (Rs. crore)
April to February**

	1995	1996	% chg.
Marine products	3,231.1	3,064.4	5.2
Spices	534.2	664.2	24.3
Meat & preparations	363.9	566.5	55.7
Proc. fruits & juices	158.4	198.7	25.4
Proc. vegetables	69.0	121.3	75.8
Shellac	43.7	56.1	28.4
Poultry & dairy	41.8	46.5	11.2
Spirits & beverages	42.3	43.6	3.1
Misc. proc. items	98.8	428.5	333.7
Total	4583.2	5186.8	13.2

**Exports of Agricultural and Allied
Products**

\$ million

	April-February		
	1994-95	1995-96	% change
Non-basmati rice	67.7	998.2	1,375.0
Wheat	9.5	76.5	706.4
Sugar and molasses	19.5	118.1	506.2
Groundnuts	30.0	61.8	106.1
Floriculture prod.	8.0	15.0	87.7
Castor oils	127.1	203.5	60.1
Meat and preparation	116.0	171.7	48.0
Guargum meal	41.2	60.0	45.7
Tobacco unmftrs. & mftrs.	72.1	104.3	44.7
Coffee	301.4	404.2	34.1
Processed fruits & veg.	72.5	96.9	33.7
Spices	170.3	201.3	18.2
Fruits and veg. fresh	122.2	142.2	16.4
Tea	286.8	327.1	15.2
Oil meals	510.2	558.6	9.5
Spirit & beverages	13.5	13.2	- 1.9
Basmati rice	242.0	228.6	- 5.6
Cashew	336.7	333.6	- 9.0
Marine products	1,030.0	927.7	- 9.9
Others	179.0	324.2	81.1
Total	3,785.7	5,366.7	41.8

**Exports of Non-basmati Rice
to Major Destinations**

\$ million

	April - February		
	1994-95	1995-96	% change
Indonesia	9.1	244.7	244.6
Bangladesh	5.4	249.0	243.6
South Africa	0.4	77.8	77.4
Kenya	12.7	88.1	75.4
Ivory Coast	0.0	29.7	29.7
Senegal	0.0	25.5	25.5
UAE	3.5	28.9	25.4
Saudi Arabia	25.4	31.3	5.9
Other countries	20.2	223.2	203.0
Total	67.7	998.2	930.5

**Exports of Marine Products
to Major Destinations**

\$ million

	April-February		
	1994-95	1995-96	% change
Japan	461.0	385.3	- 16.4
USA	132.8	90.3	- 32.0
UAE	75.1	84.2	12.1
UK	48.3	51.2	6.0
Italy	32.2	49.6	54.0
Spain	32.2	45.1	40.1
Singapore	29.6	28.3	4.4
Netherlands	17.4	24.8	42.5
Hong Kong	35.7	19.7	- 44.8
Belgium	23.4	19.7	- 15.8
Other countries	142.3	129.5	- 9.0
Total	1030.0	927.7	- 9.9

Source : Centre for Monitoring Indian Economy
- Monthly review April 1996

TRADE FAIRS & CONFERENCES

Colloquium on

"Food Quality and Safety" at Mysore

ASSOCIATION OF FOOD SCIENTISTS & TECHNOLOGISTS (India)

will hold a Colloquium on

"FOOD QUALITY AND SAFETY"

on Saturday the 7th September, 1996

at **IFTTC Auditorium, CFTRI, Mysore.**

The Colloquium will be followed by the
Award Presentation Function and AGBM.

Further details can be had from the Secretary, AFST(I), CFTRI Campus, Mysore - 13

National Symposium on "Processing, Finance and Marketing in Food Industry"

Association of Food Scientists and Technologists (India), Delhi Chapter will hold a National Symposium on Processing, Finance and Marketing in Food Industry" at the India International Centre, 40, Max Mueller Marg, Lodi Estate, New Delhi - 110 003 on 11th October 1996. It will cover some of the major constraints in the growth of the Food

Processing Sectors like marketing, finance, processing and also biochemical, microbiological and nutritional adequacy of processed food.

The programme includes invited talks and postal presentations on the following aspects :

- * Research and development in food processing industries
- * Trends in biochemical, nutritional and microbiological research in foods
- * Financial aspects from banks/financial institutions
- * Marketing - domestic, export, import and their policies
- * Plenary session

For more details contact :
Dr. H.O. Gupta

Convenor, Delhi Chapter
Cummings Laboratory
Indian Agricultural Research
Institute
New Delhi - 110 012 (India)

Global Meet on Food Processing at Bangalore in November 1996

X'treme Focus, India's first international exhibition on food processing and floriculture, will be organised at Bangalore from November 19 to 22 this year.

TRADE FAIRS & CONFERENCES

Short term courses to be conducted by Central Food Technological Research Institute, Mysore during August '96 to December '96

05th Aug to 14th Aug 96	Development in biscuit management
19th Aug to 30th Aug 96	Technology on storage, processing and quality control of foodgrains (Sponsored by FCI)
02nd Sep to 20th Sep 96	Technology of fruits and vegetable products
23rd Sep to 04th Oct 96	Post-harvest technology of fresh fruits & vegetables
14th Oct to 18th Oct 96	Recent developments in the packaging of processed food products. (Sponsored by AIFPA)
24th Oct to 07th Nov 96	Fumigation, pest control & prophylactic treatment
18th Nov to 22nd Nov 96	Thermal processing of food standards, practices & evaluation.
18th Nov to 22nd Nov 96	Spices - Technology, analysis and quality control
26th Nov to 06th Dec 96	Entrepreneurship development for rural bakers
09th Dec to 20th Dec 96	Quality control management in meat processing
23rd Dec to 03rd Jan 97	Processing of cereals and pulses

Fee Structure :

Trg. period	Trg. fee (Rs)	Board charges	Lodging charges	Total charges per participant
One Week	3000.00/-	600.00/-	150.00/-	3750.00/-
Two Weeks	5000.00/-	1300.00/-	325.00/-	6625.00/-
Three Weeks	6000.00/-	2000.00/-	500.00/-	8500.00/-

Minimum qualification for participation is science graduate or having experience in the respective area. Training fee should be given in advance by means of bank draft favouring "Director, CFTRI, Mysore". For details, please contact Head, Human Resource Development Department, CFTRI, Mysore - 570 013.

The four-day exhibition will provide a common platform for the international food processing and floriculture industries to meet, deliberate, share and develop a synergy between growers, manufacturers, technology suppliers, infrastructure providers and

facilitators, including financiers and the government.

The exposition will also host seminars on food processing and floriculture. The main objective of these seminars will be to highlight the various issues facing the food processing and floriculture industries in the

country and suggest long as well as short term solutions.

Key areas that will be covered at the food processing conference are processing of fruits and vegetables, milk and milk products, fisheries, other packaged foods and drinks and commodities like tea, coffee and spices.

CAC '96 CFTRI Annual Conference - 1996

The Annual Conference of CFTRI "CAC '96" is scheduled this year on the 4th and 5th October.

The present status of Indian Food Industry and the emerging international and domestic scenario poses serious challenges for food professionals. The opportunities and threats demand global competitiveness. The state-of-art food technology will be the cutting edge of this competitiveness. Hence, the CFTRI considers that the CAC '96 will be the platform to bring together the finest of professional minds and expertise to interact and forge lasting relationship and synergy to make the Indian Food Processing Industries competitive globally.

The 2 - day conference will present opportunities for interaction amongst captains of Indian Food Industry, scientists, technologists and policy planners. The event will include live demonstration of know-hows, technologies, glimpses on futurology of food industry and an Industrial Exhibition on the state-of-art of Indian Food Industry.

This is an open invitation to any one who is anybody in the Indian Food Industry to be at CFTRI during CAC '96.

For further details write to :
The Secretariat - CAC '96

Central Food Technological
Research Institute, Mysore - 570
013 (Phone : 22304 Telex : 846
241 FTRI IN Fax : 0821 37453)

International Symposium on Natural Colours for Foods

INF/COL-II, the 2nd International Symposium on Natural Colors for Foods, Nutraceuticals, Confectionery, Beverages and Cosmetics was held in Acapulco (Mexico) from January 23rd to 26th, 1996. Over 200 participants from the U.S. and 30 foreign countries heard more than 40 papers presented by scientists from universities and natural color producers, geneticists/horticulturists, regulators from government agencies as well as by experts on the analysis, application and marketing worldwide of natural colors.

The next Symposium (INF/COL-III) will be held in Sevilla (Spain) during April 1998 under the co-sponsorship of The Hereld Organization (Hamden CT), the Universidad de la Mancha (Albacete, Spain), the Instituto de la Grasa/U.E. Biotechnology de Alimentos (Sevilla) and with the sponsorship of the Spanish natural color/spice industry.

Anuga Foodtec- International Food Tech- nology Fair

ANUGA FOODTEC is a new Trade Fair which results from the amalgamation of two well known German trade fairs. One is DLG Foodtec, the most important event for liquid and viscous food technology, held

upto now in Frankfurt, and ANUGA Technica, the food technology sector of Anuga, the World Food Fair. One will find the complete range of technology and expertise covering all aspects of food processing.

The spectrum ranges from raw material receipt through processing to packaging of finished product, its storage and distribution. Trends and innovation will open up new applications and markets.

The sectors covered by Anuga Foodtec are as under :

□ Dairy, □ Meat, Fish, Poultry □ Fruits, Vegetables, Potatoes □ Fine Foods □ Baby foods □ Conserves/Pickles □ Ice Cream □ Fruit Juices □ Oils, Fats, Margarines □ Confectionery □ Cereals □ Bakery & Pastry Products □ Frozen Food □ Ready Meals □ Coffee, Tea.

Anuga Foodtec will be held at Cologne, Germany, from 5th to 9th November 1996. For further details please contact Indo-German Chamber of Commerce, Shah Sultan, 4th floor, Cunningham Road, Bangalore - 560 052. Telephone No. 2265650

International Symposium on "The Microbiological Safety of Processed Foods"

The Hindustan Lever Research Foundation is organizing a 2-day International Symposium on "The Microbiological Safety of Processed Foods" in Bangalore on December 2 and 3, 1996. The

TRADE FAIRS & CONFERENCES
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emphasis of this symposium will be on education and training in Food Microbiology in order that the appropriate expertise be developed to benefit India's expanding food processing industry.

For details contact :

Dr. B. Marthi,

Convenor

HLRF Symposium on "The Microbiological Safety of Processed Foods"

Microbiology Section

Hindustan Lever Research Center,

ICT Link Road, Andheri (East)

Mumbai - 400 099

Tel : (022) 8329471

Fax : (022) 8363680

E-mail : Balkumar.Marthi @
hlbin.sprint com (on Internet)

**KARNATAKA STATE INDUSTRIAL INVESTMENT
DEVELOPMENT CORPORATION LIMITED**

'MSIL House', 36, Cunningham Road,
Bangalore - 560 052.

FOR SALE

The following assets of M/s Anitha Sausages & Foods Pvt. Ltd., situated at Sy. No. 123 to 127, Mallinathapura Village, Bilikere Hobli, Hunsur Taluk, Mysore District, are available for sale on 'AS IS WHERE IS CONDITION'

LAND : To an extent of 7 acres & 26 guntas

BUILDING : 1276 Sq. Mtrs. sheet roofing and partly RCC roofing.

PLANT & M/C : Meat processing machinery, both indigenous and imported.

Persons interested in the purchase of the above assets may get in touch with AGM, KSIIDC LTD., Sunder Arcade, Mysore-Ooty Road,
Mysore - 570 001 (Ph : 25422, 31944) for further details.

AFST(I) NEWS

Bangalore Chapter

AFST(I) Bangalore chapter conducted a one day Colloquium on "Food Laws for Consumer Safety" on 4, April 1996 in Hotel Oberoi at Bangalore. About 100 delegates actively participated in the colloquium. The overwhelming response from the industry and members made it a great success.

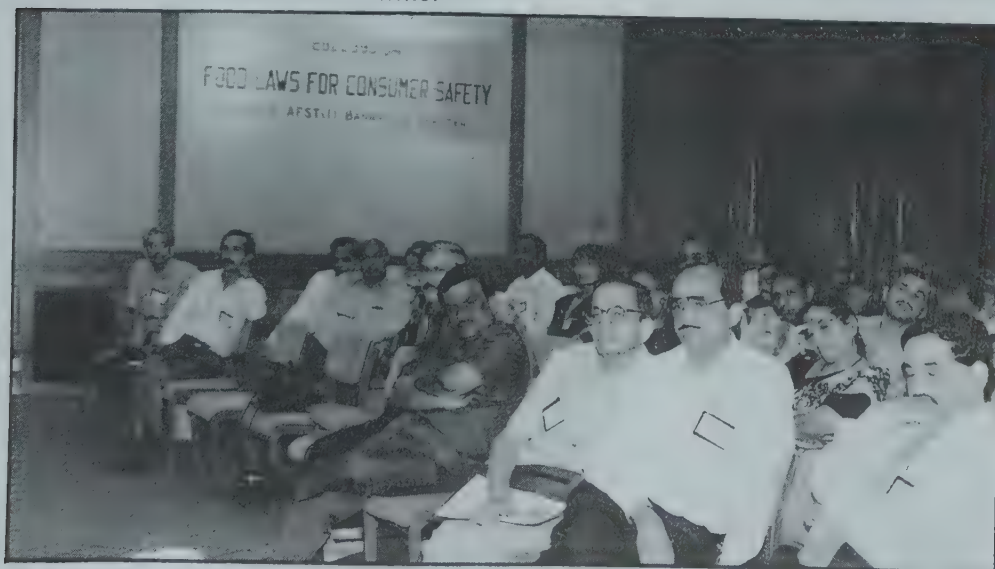
Bhopal Chapter

AFST(I) Bhopal chapter organized a lecture on the topic "Food imbalances and health complications" on 15.4.1996. Dr. S. D. Kulkarni, Hon. Secretary welcomed the gathering. Dr. Nawab Ali, President introduced the main speaker and chief guest. The main speaker was Dr. Vidyadhar Kawalkar, Executive Director (Food & Nutrition Tech. Organization, Bhopal) who spoke of the specific role of food imbalances

in creating health complications and stressed the need for consumption of fresh fruits, vegetables and foodgrains without use of chemicals etc. He highlighted the complications related to heart, blood, brain, kidney etc. Dr. K. K. Tiwari, former Vice-chancellor, Jiwaji University, Gwalior, chaired the meeting and drew the attention to aspects dealt by Dr. Kawalkar vis-a-vis health care. Mr. Nachiker Kotwaliwale, Hon. Treasurer proposed a vote of thanks.



From Left : Mr. H. C. Bhatnagar, Dr. A. S. Aiyar, Mr. T. S. Nagarajan, Dr. Kaicee Alexander



A View of the audience

Kharagpur Chapter

AFST(I) Kharagpur Chapter organized a 3 days training programme on "Home Scale Processing and Preservation of Fruits and Vegetables for Mass Employment Generation of Rural Women" during April 24-26, 1996 at APC, Abhoy Ashram, Balarampur. It was attended by 15 participants from four different voluntary organizations, e.g., Renuka Training & Welfare Society, Abhas; Mahila Kalyan Sangha, Khelkar; Kasturba Gandhi Foundation, Balarampur; and Abhoy Ashram, Balarampur of Midnapur district of West Bengal.

Released !

Released !

Trends in Food Science and Technology (Proceedings of IFCON - 93)

Association of Food Scientists and Technologists (India) is happy to announce the release of its much awaited and prestigious publication of the Proceedings of the Third International Food Convention (IFCON-93), held at Mysore during 7th-12th September 1993. The volume entitled "**Trends in Food Science and Technology**" constitutes edited versions of 145 research/review papers presented by eminent authors who are experts in their respective areas of research at 24 symposia. The publication (ISBN 81- 900556-0-7) covers a broad spectrum of information in the form of articles of current interest in Food Science and Technology on Policy Issues, R&D Management, Agro Development, Research & Development Trends, Technology Transfer, Emerging Technologies, Biotechnology, Human Nutrition, Foodgrain Storage, Foodgrain Processing of Wheat and Rice, Fruit and Vegetable Technology, Plantation Products, Oilseeds, Animal Products, Milk Products, Traditional Foods, Convenience Foods, Street Foods, Packaging Material, Thermal Processing, Food Quality Assurance, Safety and Standards, Human Resource Development, Waste Disposal and Control of Environmental Pollution.

The publication is intended to serve as a standard reference volume for all those interested in Food Science and Technology and also in allied disciplines. The book is hard bound and laminated.

The publication with over 1120 pages, is priced Rs 1250/- (India) or US \$ 200/- (overseas) inclusive of postage.

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